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VOLUME 20

IN THE SUPERIOR COURT,

State of California, County of Sacramento.

OCTOBER SESSION, 1881.

HON. JACKSON TEMPLE, - - - - - PRESIDING JUDGE.

WINFIELD J. DAVIS, OFFICIAL REPORTER.

SAMUEL OSBOURNE AND WILLIAM M. CUTTER, REPORTERS.

The People of the State of California,

vs.

The Gold Run Ditch and Mining Co. }

COUNSEL:

For Plaintiff,

HON. A. L. HART, Attorney General, GEORGE CADWALADER, ISAAC S.
BELCHER, A. L. RHODES, RICHARD BAYNE.

For Defendant,

J. K. BYRNE, W. C. BELCHER, S. M. WILSON, W. T. WALLACE, A. B.
DIBBLE, A. P. CATLIN.

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In the Superior Court
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Winfred J. Davis
Official Reporter

In the Superior Court of the
State of California in and
for the County of Sacramento

The People of the State of California	} Tuesday Decr 13. 1881.
vs.	
The Gold Run Ditch and Mining Company	}

Afternoon Session

Testimony
of
Hamilton Smith

<resumed>

Mr Dibble Q I desire to withdraw the last question I asked the witness so as to allow him to finish the answer to the preceding question

The Court The last question has been answered has it not?

The Reporter No sir

Mr Dibble Now for the purpose of enabling Mr

Smith to complete his answer to the preceding question, I desire to withdraw the last question which I put before recess
The Court Very well
The Witness Shall I go on sir?

Mr. Dibble Yes sir. With the consent of the Court of course

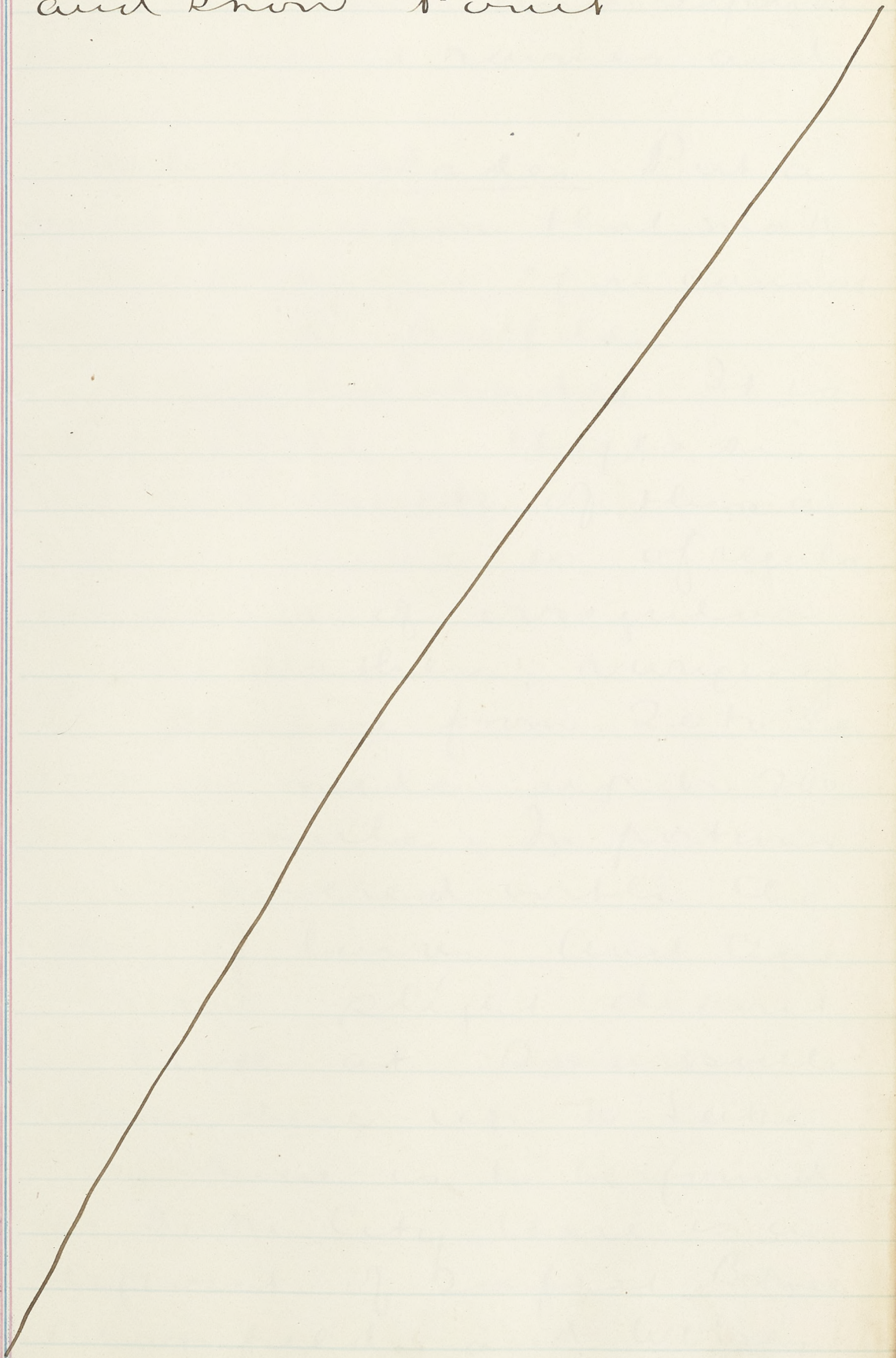
The Court If you had not completed your answer to the former question you cannot do so

The Witness I would like to call the attention of your Honor to the position of the gravel channel between Gold Run and where it emerges ~~into~~ the plains close by Marysville. You find the gravel, the surface gravel extending here with no bed rock in sight. That is near Marysville; between Shick and ~~the bed rock~~ ~~the bed rock~~ is below tide water. Extend my up by Smartsville the

bed rock is 3 or 4 hundred
 feet above tide water
 The gravel channel is
 marked and has been
 worked up on as far up
 as to ~~muddy~~ ^{mooney} Flats. There
 it disappears with a
 trace left of it there, on I will say
 just the other side of
 Deer Creek. It has been cut
~~in~~ there by Deer Creek.
 The channel has been washed
 away ~~by~~ ^{to} French Corral
 on the North side. Thence
 it continues to North San Juan,
 with several breaks where
 it ~~the~~ ^{was} cut away by ^{Birchville} ~~Burch's~~
 Ravine and Sweetland
 Ravine and Sebastopol Ravine.
 You find the gravel channel
 again at ^{Badger} ~~Butcher~~ Still.
~~Being exposed~~ ^{having disappeared}, where it
 has been washed away
 about 4 or 5 miles by the
 gulch River. From ^{Badger} ~~Butcher~~
 Still the channel continues
 to Columbia Still where
 it forks. One branch going

North through Bloomfield
 and Mire's Flat to Wolsey's
 Flat extending up to
 Sierra County & Plumas
 County; and the other
 branch of the channel
 extending across from
 Grizzly Hill to ~~Go~~^{Go}
 Hill being cut in two
 by the Round Yuba River.
 Between the channel con-
 tinues in a South Easterly
 direction from Blue Tent
 across ~~the~~ Hunt's Flat in
 Deer Creek and through
 to Pargent and ~~James~~^{Jacob's}
 claim to Decker Hill.
 Extending thence through
 Red Dog and Rion Bel
 and up to Little York
 and thence to Dutcher
 Flat and then connecting
 with the channel as
 shown on the plan; with
 the channel on Gold Run
 the section which is
 marked "Hamilton Smith
 No 3" shows the gravel

channel as extending
between French Corral
and Snow Point



An examination of that map shows which way it is cut in two and separated by different ravines and rivers

Mr. Adwalades Put a compass upon that map

The Witness You cannot that is a profile

Mr. Adwalades It is a profile? Alfred is the bed rock of this ancient river is of regular grade or of irregular grade rather, varying in places from 20 to 30 feet a mile up to 200 feet a mile. In portions it is covered with the flow of lava. And there is some slight deposit of lava at Smurville. From there up to Lake City none is to be found at Lake City there is a deposit of 200 feet. Between Bloomfield and Wolsey that there is a deposit

of 600 or 700 feet of lava
~~underneath~~ ^{above} the gravel.
 That section of this ancient
 channel is pretty well
 shown on this map of the
 Uren's; where it has a
 width at the bottom of
 3 or 4 hundred feet and a
 width on the surface
 of some 2000 or 2200 feet.
 The gravel in the lower
 portion of the channel
 is called the blue gravel
 generally from its color
 which is blue. The
 upper gravel is called
 surface gravel. The gold
 is —

Mr. Leadwalader ^(mtg) You
 divide the earth into two
 parts. Ages in

① Taking red earth for
 the first part? At well,
 the red earth ^{extends} is followed
 down for a short distance
 5 or 10 or 20 feet. The sur-
 face gravel is sometimes
 red. I have seen red

banks 150 feet deep; of almost pink color. Generally they are white. The gravel in the upper portion of the deposit is small as a general thing; with large bodies of pipe clay frequently occurring on one side or the other of the channel. The gravel in the lower portion, or the blue gravel, contains much larger boulders; and in places, great numbers of them. These boulders are sometimes and are generally the thickest and heaviest nearest to the bed rock at the bottom of the channel. Though in many places I have seen these ancient boulders of a very large size indeed, at 50 to 60 feet up from the bottom of the channel.

Mr. Cadwalader It is

stratified deposit is it not?

Mr Becher Let him tell his story and you can cross examine him afterwards.

The Witness The length of these gravel channels in the state in which they exist now -

Mr Leavelle I object to that as not coming within his personal observation.

Mr Becher He has already stated that he has visited these claims personally and had full opportunity to examine them.

The Court go on.

The Witness All these gravel channels are known to be certainly over 200 and probably 300 miles in length.

Mr Hart Is that the sum total? A I said 300 miles. Over 200 certainly, and probably

there are ~~some~~ over 300 miles

Mr Start Of all the gravel channels. Ayes sir, I don't state that as the maximum. I think the maximum is larger. But I know that they extend certainly over 300 miles in length; Into these gravel channels small ravines and creeks empty ~~into them~~. But they are also filled with gravel. Very frequently, even comparatively small ravines or rivers are found to be very rich indeed; containing a large quantity of gold. The gold is deposited with pretty fair uniformity throughout the length of this entire deposit, which in some places has a depth of as much as 600 feet. In other places it is very much shallower; sometimes

only 20 feet in depth
 The top gravel is poor
 Comparatively; compared
 with the bottom gravel.
 The gold in the ~~top~~ gravel
 is finer, very much
 finer than it is in the
 bottom. And another
 point, the lower you descend
 the channel and the nearer
 you approach the plains,
 the finer the gold is. It
 does not follow from that
 that the gravel is any
 poorer, Because the richest
 gravel that I have seen
 at any point is at
 Smartsville; a mine
 which is almost the nearest
 to the plain of any
 that has been worked.
 I say that the gold is very
 fine there; still there is
 a very large amount of it.
 and the yield per yard
 at Smartsville is almost
 as much as, if not larger
 than, at any other place

I have observed, where any considerable extent of mining ground has been worked. In some places, and especially in the gravel channels in Sierra County and in portions of Placer County also, the gold is found, or nearly all the gold is found quite close to the bed rock. And as a general thing the gold is deposited pretty uniformly, and gradually gets poorer and poorer as you come from the bed rock. It is so with most or nearly all the deposit: ^{But} ~~that~~ the surface gravel or the gravel immediately on the surface is generally ^{richer} ~~lighter~~ than that lower down. It is so with most of the deposit. The gravel there having been by the natural wash carried away. But the gravel there also has been

enriched frequently by the natural washing away of the gravel which was immediately above. So that the surface gravel is frequently quite rich even on the top. The top gravel showing often 10 or 15 feet of rich gravel.

Mr Dibble state as concisely as you can the progress of gold mining in California from 1848 to the present time.

Mr Leadwalaader I object to that except so far as he knows and speaks from his own observation. The Court he may state the judgment he has arrived at from his own knowledge of the mining districts where this work has been done, upon river beds?

A I can state from my own knowledge of work that has been done in many

districts upon the river beds. where the gold had aggregated in large quantities in many places, and immediately below that, immediately below these ancient gravel beds, where it had been washed away by the operations of ^{the present} ~~the~~ system of rivers, there the richest bars were found Mr Badwalade, we must object to this: that the witness must state matters of personal observation.

The Court of course that is the understanding. the witness has been repeatedly told that

Mr Badwalade I understand that Mr Smith has not been in this country but a few years. That is a fact which is generally and well known. Now I object to having him go back and say that he infers that such and such a thing is so when

he has no personal knowledge of the facts. We will never get through this case in the world in that way and it may follow that the plaintiff is upset by a theory, for the correctness of which the witness had only that kind of knowledge which is derived from information but we understand the Court has ruled that this witness is to be confined to matters of personal observation. Now he has made his disavowal statement; and let the remainder come from his personal observation.

The Court I understand that it all comes from that source. I do understand it.

Mr. Caldwell And then again I object on the ground that it is not relevant. His statement, thrown in

as to where the greater part
of the gold is found in
these rivers

Mr Dibble Proceed with
your statement

As the gold, for instance
Mr Badwalader (intg) he
would like, if the Court
please, to have a direction
to the witness in regard
to this matter

The Court Well he has been
directed a dozen times and
at your request. I suppose
he understands it

Mr Badwalader Well he
don't seem to pay any
attention to it.

Mr Belcher Well, if
Counsel would pay attention
to the rulings of the Court
I think Counsel would
not interrupt the Witness
so much

Mr Dibble Proceed

The Witness The such
washings in the rivers as
a general thing were found

immediately below where
 the present rivers had
 washed away these an-
 cient channels. The miners
 having worked these bars
 where ~~natured~~^{nature}, had de-
 posited the gold for them
 and after having pretty
 well cleaned it up, pro-
 ceeded to search for the
 source of this gold.
 They went up on the banks
 and found deposits on
 the banks of these streams
 immediately alongside
 and above the river
 beds. They worked these
 for a while but soon found
 that they were not of large
 extent but were bounded
 on the side by the bed
 rock of the river! - on the
 river side. Then they
 passed up higher and
 higher until at last they
 found themselves in the
 gravel channels from
 which the gold originated

which they had first found.

This first mining was all done by the action of water; by the use of water in the river beds. Mining as it was practised at the first, and as practised now to some slight extent, consisted in fluming ~~on~~ the river: taking up all the water of the river and taking out the gravel and running that through ~~into~~ the sluices. The water being carried around the gravel bed while this mining was going on in the bed. The mining in the bank was generally ^{done} by digging short ditches into or around the mining ground. These ditches were necessarily short because this bank or hole mining, as it was termed, was ~~not~~ only a slight elevation above the river: requiring

120
 short ditches. This was continued for a short time, or until these diggings began to be exhausted; when the miners found the sources of gold in these ancient channels. And then they commenced to construct ditches which were of necessity very long. Because in many places the ancient channels were 6 or 7 and sometimes 13 hundred feet above the beds of the present streams. That necessitated the building of very long and costly ditches; of which there are many in the mining districts, as has been already stated. Mr Badivalades we object to that. We object to his stating as to what he supposes created a necessity for bringing water into mining property, in long ditches. It is irrelevant

The Court Proceed
the witness In order to
 work these ancient rivers,
 it was necessary also
 to drive long tunnels,
 I think

The Court You can avoid
 objections by stating, if
 you know, that they had
 to do this.

The witness They had to
 do it. It was necessary;
 and they did it

Mr Dibble What relation
 do these ancient river
 deposits bear to the present
 streams in reference to
 receiving the wash by the
 operations of Nature itself?

Mr Badwalader We suppose
 that that thing has been
 gone into sufficiently

The Court Is there anything
 further, except to state—
 as already stated—
 that these are higher?

Mr Dibble I want to show
 the washing of these old

carries by Nature itself
into the present ravines.

124 - The Court It seems to me
that so far as you want
that it is already in
evidence; from the fact
he has shown that these
streams crossed them and
washed them out. I presume
that is what you want to
prove.

Mr Dibble I want to show
that immense masses
were washed from these
old streams into these beds.

Mr Becher Will the Wit-
ness explain a little
as to the bars which we
find as we ascend up
the stream? These bars
that have been worked
of which he has spoken.
The bars of which the
Witness has already testified.

The Court I think that
has already been gone
into far enough. You
may have something in

your mind which I don't know of. But it seems to me that that examination has gone far enough. I don't care to go in to this matter of ancient history ~~or~~ these scientific theories more than is necessary. The less we get in of that, the better able we will be perhaps, to understand and appreciate the weight of what we have in already or what must necessarily come in.

Mr. Badwalader We think that this gentleman should be restricted to a statement of his own observations and his own knowledge as near as we can get at it. And we ask the Court to so instruct him.

The Court I have told him so. I don't know as it would do him any good to tell him any more.

Mr. Dibble Can the question

be answered or not?

The Court Well I supposed from what was said that it had been sufficiently answered

Mr Dibble O what has been the result of the gold washings in California as to amount from 1848 to 1881?

Mr Leadwaler I object to that as calling for a conjecture and as immaterial in this case.

The Court I suppose that experts are always put upon the stand to give their opinions

Mr Start This is not a matter of expert testimony but a matter of mere opinion

Mr Leadwaler We will admit that it was a large amount

Mr Start The question as I now understand it is as to the amount of money

made out of this industry.
 Now that is a matter of
 mathematical calculation
Mr Cadwalader They call
 for the amount of gold
 taken out; the gross
 amount. That makes an
 examination into the net
 amount necessary, the
 object that it is irrelevant

The Court If the only
 objection is that it is
 not the net yield that is
 called for, I will overrule
 the objection

Mr Starr That is not the
 objection, while Mr Stall
 might testify as to the
 amount of water that
 would carry a certain
 amount of earth in sus-
 pension down upon the
 agricultural land, this
 is another matter, as
 to the amount of gold
 that has been actually
 taken out it becomes a
 matter of mathematical

calculation. That is a matter of fact which is susceptible of determination by testimony other than that of an expert.

The Court That must have been made up in statistical tables, I suppose, which are accessible

Mrs. Noble Not up to the present time.

Mrs. Hart We do not deny that there has been a great deal of gold taken out. We don't wish to consume any considerable amount of time in the examination of that question. We are willing to concede and admit that a very great amount of gold has been taken out in mining in California.

The Court Have you examined in regard to it?

The Witness I have a table here. These are my own figures, compiled

by myself from original sources

Mr Star Where did you get those figures, Mr Smith?

As they have been compiled from original examinations by myself from a number of different sources

The Court This is a class of testimony which I suppose the Court could get from history. It is only allowing the witness to state what the Court could get from history. It is only a matter of convenience. Probably the quickest and best way would be to let the witness state, go on.

The Witness The amount of the production of gold in California has been stated by a good many authors; some of whom differ, but not very considerably in the sum total. I have taken a good deal of pains in

my examination of the statistics; and have prepared a table as the result of my examination which I think is more correct than any thus far published. According to my table, the yield of gold from 1848, when it was first discovered in California in any considerable quantity up to June 30 1881 has been 1154 millions, 689 thousand and 39 dollars.

The Court Do you wish to look at this table general

Mr Hart Yes sir. I would like to look at it.

Mr Dibble I would like to submit that table as an exhibit

Mr Hart This product of gold has come from where?

A This amount of gold has come either directly or indirectly from the gravel channels including

that in which are the gold Run claims. Including that in which the gold Run claims are situated

Mr Dibble Q About how much has come from those claims? A About 900 millions from these channels

Mr Dibble Describe the particular process known as hydraulic mining?

And state in particular in what respects it differs from placer, river, drift, seam and quartz gold mining?

Mr Leadenalades The kind of mining is stated in the Complaint and admitted in the Answer. A All

Q All gold mining in California is nothing but hydraulic mining. Because there is the same principle in each kind. In each of the different sorts of

mining of which you have spoken the same general principle is involved, that is by the action of running water, the material ^{in which the gold is} is embedded is separated from the gold; and the gold by virtue of its superior specific gravity is left behind. So that all gold mining in California is practically hydraulic mining. What is technically known as hydraulic mining, what ~~is~~ the general acceptation and significance of the term in California is: the washing away of the material in which the gold is found by hydraulic power. But the old bar mining, and the old high bank or river mining was done by hydraulic process. Water is brought at some little elevation above the point at which

it is desired to discharge
 it, and thence taken
 down to the mine, either
 by hose made of rubber
 or of cotton, or through
 iron pipes. Taken down in
 that manner and discharged
 under pressure against the
 bank. Although I have
 seen bydraulic mines,
 myself, and mines that
 were very extensive ones
~~too~~, where the water was
 not discharged under
 pressure; where the water
 was allowed to run over
 the top of the bank, that
 would be considered a
 sort of ~~a~~ bydraulic mine.
 But all gold mining in
 California is necessarily
 bydraulic. In placer
 mining, the miner sep-
 arates in his pan or in
 his rocker or in his "long
 tom" the earthly material
 from the gold just in
 exactly the same manner

except on a smaller scale,
 as the hydraulic mines,
 technically so considered,
 operates. It is the same
 process in both instances;
 the hydraulic process
 In seam mining, the
 process is a hydraulic
 process; the material
 included in these seams
 being washed from the
 hills by water under pressure.
 In quartz mining the
 quartz is raised from the
 mine and then crushed;
 and then by the action of
 gravity through running
 water the gold is separ-
 ated from the quartz
 sand; the quartz sand
 being washed away and
 the gold remaining behind.
 The process is really the
 same in all these dif-
 ferent sorts of mining
Mr Belcher We offer the
 paper which the witness
 has presented in connection

PRODUCTS

OF

PRECIOUS METALS IN CALIFORNIA

1848 TO JUNE 30, 1881.

The figures from 1848 to 1857 inclusive, are based upon estimates made by Mr. Louis A. Garnett, late manager San Francisco Refinery. The estimates from 1858 to 1870 inclusive, are made by Professor Raymond, Official Report as Mining Commissioner. 1874, page 543. From 1871 to June 30th, 1881, from the official estimates of Mr. John J. Valentine, Superintendent of Wells, Fargo & Co.

1848—1870 inclusive.

1848.....	}	\$15,000,000	Forward	\$648,100,000
1849.....			1860.....	45,000,000
1850.....		45,000,000	1861.....	40,000,000
1851.....		75,000,000	1862.....	34,700,000
1852.....		85,000,000	1863.....	30,000,000
1853.....		75,000,000	1864.....	26,600,000
1854.....		65,000,000	1865.....	28,500,000
1855.....		65,500,000	1866.....	25,500,000
1856.....		65,000,000	1867.....	25,000,000
1857.....		57,600,000	1868.....	22,000,000
1858.....		50,000,000	1869.....	22,500,000
1859.....		50,000,000	1870.....	25,000,000
Forward		\$648,100,000	Total	\$972,900,000

1871—June 30, 1881, inclusive.

YEAR.	GOLD.			SILVER.		
	Carried by Express.	Carried by other conveyances.	TOTAL.	Carried by Express.	Base Bullion and Ore.	TOTAL.
1871.....	16,167,484	3,279,870	19,447,354	231,870		231,870
1872.....	16,493,922	1,649,392	18,143,314	233,668	673,116	906,784
1873.....	15,709,956	1,570,995	17,280,951	264,771	480,000	744,771
1874.....	16,015,568	1,601,556	17,617,124	967,857	1,715,550	2,683,407
1875.....	14,842,010	1,484,201	16,326,211	387,768	1,039,172	1,426,940
1876.....	14,635,963	1,463,596	16,099,559	796,308	1,719,940	2,516,248
1877.....	14,512,123	725,666	15,237,729	1,202,751	1,734,236	2,936,987
1878.....	16,482,389	824,119	17,306,508	809,431	804,522	1,613,953
1879.....	16,348,730	817,436	17,166,166	739,440	285,367	1,024,807
1880.....	16,900,745	845,000	17,745,745	378,567	151,854	530,421
First six months of 1881.	8,969,878	448,500	9,418,378	298,264	(?)	298,264
Total.....	\$167,078,768	\$14,710,271	\$181,789,039	\$6,310,605	\$8,603,757	\$14,914,452
						\$196,703,491

RECAPITULATION.

	GOLD.	SILVER.
1848—1857 Garnett	\$ 548,100,000	
1858—1870 Raymond	424,800,000	
1871—June 30, 1881 Valentine	181,789,039	14,914,452
Total	\$1,154,689,039	\$14,914,452

Being an aggregate of about 1170 millions of dollars since California belonged to the United States.

1800.....	10,900,745	845,000	17,745,745	378,567	131,854	539,421	18,276,166
First six months of 1881.	8,969,878	448,500	9,418,378	298,264	(?)	298,264	9,716,642
Total	\$167,078,768	\$14,710,271	\$181,789,039	\$6,310,605	\$8,603,757	\$14,914,452	\$196,703,491

5475

with his testimony; the paper which was submitted to Counsel; we offer it as an exhibit in connection with the Witnesses answer in regard to the product of gold in California. This gives it in detail.

The Court Have you any objection to that; gentlemen?
Mr Hart No, I suppose not. I don't suppose it is competent however.

The Court I suppose it might be admitted as a convenient presentation of history.

Mr Belcher We offer it to go into the notes after the answer of the Witness to go into this matter.

Mr Hart Well, The Court may use it, but I don't know as it is proper to be put in evidence.

Mr Belcher I submit that it is proper to be put in evidence — and much

more convenient — instead of having the witness state all these things in detail. It should go in as a part of his answer.

The Court Well, it doesn't really seem to be objected to. Let it go in.

Mr Dibble Q What is the effect of placer, or river, or seam, or drift, or quartz mining, with reference to polluting the streams or other waters? A. Any gold mining of any claim of any kind whatsoever, wherever practised, necessarily results in muddying or polluting the water. And it is impossible to produce or obtain gold without the hydraulic process which I have before described.

Q State what are the essential elements requisite for the successful development of hydraulic mining?

Q In the first place it is necessary that there should be gold enough in your gravel beds to pay for the working, Next: the mine must be situated at an elevation above some dumping place, so that an outlet can be obtained in which the material washed from the mine may be deposited. In the next place: it is necessary to have water with which to wash out the mine. And for the very successful working of a mine or of any claim like that in Gold Run, it is necessary to have large storage reservoirs in connection with the mining ditches or canals, from which in the dry season water can be drawn with which to wash.

Q State whether in the last ten years there has

been an increase or
diminution in the quantity
of material mined from
hydraulic mines of the
State? or in the State?

A I think that in point
of fact —

Mr. Adwalader (intg) This
must also be a matter of
your own knowledge

The Court Confine your
answer to your own observa-
tion? A I will try to
do so sir. In the last
eight years certainly — I
won't say ten years — I
think there has been a
diminution rather than
an increase in the amount
of material washed out
from hydraulic localities
or districts.

Mr. Dibble Give your
reasons for this statement

A These ancient river
beds in which, in this
State the hydraulic gravel
mines are situated or

located, are generally bounded on either side by a rim of bed rock. In order to wash the lower gravel, it is necessary to run tunnels; and in many places these tunnels have to be of very great length. The bed rock is very hard and these tunnels are very expensive. This first mining that was done in these ancient river beds was done on the surface ~~and~~^{which} was easily reached. I may make a simple illustration in this particular mine, the Gold Run Mine. Just below the surface to the east of this gold mine was Cañon Creek. And it was a very easy matter to obtain a drainage or outlet for the top gravel into Cañon Creek. It was also easy — there being steep grades — to make the surface excavations. Therefore

~~the~~ most of the mining which
 was done prior to ten years
 ago was in the top surface
 gravel, which was easily
 washed; being conveniently
 situated and being of
 light character, — containing
 but few boulders. It was
 washed through places of
 steep grades; ~~and~~ ^{which} much
 increased, comparatively,
 the amount of material
 which could be washed
 away. After a few years,
 when the surface was
 washed off in these mines —
 as has been the case
 with the Gold Run mine —
 it was necessary to run
 these long tunnels, and
 as a general thing it was
 impossible to obtain as
 steep a grade in these
 tunnels as the miners
 had when they washed
 the surface gravel.
 Therefore, generally, in
 California, mining is now

chiefly confined to this
 bottom gravel; which is
 full of boulders; which
 washes slowly and which
 is discharged through sluices
 having light grades. In
 old times, the surface
 gravel was chiefly washed
 over steep grades. Therefore
 — having stated the premises
 and reasons on which I
 can answer your question,
 — I reply, that I do not
 think that more than one
 half or one quarter as
 much material is now
 washed away in the
 mining districts of Cali-
 fornia as was washed
 ten years ago. The amount
 of water for the working
 of these gravel mines
 has not increased very
 largely. I do not think
 it has. I know that in
 point of fact it has not
 increased very largely
 since 1873 — 8 years ago

And therefore I know that I am right in stating that not so much material is now washed from the gravel mines of this State as was washed 8 years ago.

Mr. Noble What improvements have been made in the last 12 years in hydraulic mining. I refer to monitors, little giants, electric lights etc? Describe them? A The monitors or little giants have superseded the cotton hose and rubber hose which was used before. The little giant was invented first. That is the first one of the improvements you named. I think I used the first little giant that was ever used in gravel mining. That was in the year 1869. That was the first one of any size that had been used. The object of the

Little part of the
 monitor — it is called by
 either of those names —
 to discharge a large amount
 of water through one jet.
 Now 12 years ago, in 1869,
 at the North Bloomfield
 mine where I then was,
 some dozen or 15 water
 jets were employed, and
 at each one of these jets
 it was required that a
 man should be stationed
 to direct it. At present,
 we run through a single
 nozzle as much water as
 those fifteen nozzles dis-
 charged. The Monitor
 therefore saves labor in
 that respect. We have
 only one man now, neces-
 sarily to direct the water,
 where, in old times,
 a dozen or more were
 necessary. But the Monitor
 has another great ad-
 vantage. By its use,
 we have the water under

entire control. A single man can control this large stream of water with perfect facility. The great trouble in mining frequently is — or was — that your water washes too much material into the sluices. But by having an instrument like the Little Giant you can turn the water from the bank and stop its cutting; and simply devote the water which emerges through the nozzle for the purpose of washing off the material which is already down from the banks.

Q Do these improvements allow the miners to wash a greater amount of material than they did before these improvements were made? A They certainly do not. The amount of material that

can be washed from the mouth of a mine of any sort - especially of a mine that is worked by hydraulic process - is determined solely by three factors. First, as to the character of gravel? Whether the gravel has a large amount of small sand or carries a large number of large boulders. As to what proportion there is of sand or of boulders. The next factor is the amount of water used, and next as to the steepness or inclination and capacity of the sluices used, through which the gravel is discharged at the bottom. And all these improvements which have been made in hydraulic mining for the last 12 years are simply labor-saving improvements. They have not assisted, one may

pay, in carrying off a single ounce more; he cause that matter is determined by the grade and the water and the character of the ground

Q What is the amount of money invested in all classes of gold mining in this State?

Mr Start Now that is another question which we insist the witness shall speak upon knowledge of his own and not from statistical tables

Mr Caldwell It is a question which just calls for a speculation

Mr Belcher There is no speculation about it.

The Court If you know of your own knowledge you can state

A I believe that about 160 millions of dollars has been invested

Mr Start He "believes" so!

Of course that is a very peculiar kind of testimony
Mr Badwalader That is a kind of ignis fatuus
The Court I suppose you would admit it to be some large sum?

Mr Hart We will admit it to be a large sum. But we insist that we shall not be confronted with testimony as to the exact amount by witnesses who deal in speculation or hearsay or any kind of third rate evidence in regard to the matter.

The Court Certainly you are not bound to accept this testimony as conclusive upon you; the witness says he thinks it is 160 millions of dollars.

The Witness At least 160 millions. I say it is as much as that.

Mr Wibble Q What is the amount of capital invested

150 (5)

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in the hydraulic mines of California? And not less than 100 millions of dollars

Mr. Starr Now you draw a distinction between hydraulic and other mines. I thought you said they were all hydraulic mines a little while ago

Mr. Dibble There we are talking of what are specifically called hydraulic mines? From what sources has this capital been derived?

Mr. Badger We object to that as purely irrelevant; whether it is got from the English or the Irish or the French or the Americans or the Russians or the Prussians

The Court I don't see any particular point in the inquiry. All is: there is so much involved — or about so much in a supposed

industry. All the investors are equally entitled to be ~~protected~~ wherever they come from.

Mr Belcher Undoubtedly they are equally entitled to the protection of the law. And yet may we not properly show that it is mostly California Capital that is so invested, in this industry. If we show that, it might have its influence more or less with the Court.

The Court I think not, I am not sitting here as a legislator.

Mr Starr It might in a Justice of the Peace Court.

The Court Coming down to the question of law it could have no weight. Whenever we arrive at the facts, the question of policy may be elsewhere considered. But in that respect, the only

question which we can consider is a question of law

Mr Belcher It has been stated that a large portion of the capital invested in this industry in this State was the property of foreigners; and that they were coming here and making money out of our mines but destroying the property of our own people. Now all that we propose in this connection is simply to show that a very large proportion of the capital invested in this industry in the State is the property of the People of the State; and that the proportion coming from outside the State is a very, very small one. A very, very small proportion

Mr Caldwell I understand the Court to rule

that out

Mr Belcher If the Court excludes the question, then we make the offer to show that more than nine tenths of all the Capital invested in this mining industry in the State of California is California Capital.

Mr Hart I would admit that if it were not for the fact that I do not wish to reflect upon the Judiciary of this Country, by insinuating that it would not be sufficiently honorable to protect foreigners as well as native born citizens in their ^{property} rights. That is the only reason I have for not admitting this offer or this testimony. I think the Judiciary of my country is too honorable to be moved by considerations of that kind.

The Court Do you object
to the testimony offered?
Mr Hart I don't care
anything else about
that question in particular
but I don't like to hear
insinuations of that kind.

The Court Unless you
object to it, I shall not
make a ruling against
it.

Mr Hart Then I object to it on
the ground that it is
immaterial.

The Court It seems to
me that is so.

Mr Belcher We have an
exception

Ex

Mr Noble What sums
have been invested in
the hydraulic mines
with which you have
been specially familiar?
and in what way has
this money been expended.

The Court I understand
that they have admitted
on the other side that

large sums were invested
Mr Cadwalader we have
 admitted that large sums
 were invested

Mr Wallace Well if you
 will mention some sum
 your admission may have
 some value

Mr Dibble What sums
 have been invested in
 the hydraulic mines
 which you were specially
 familiar and in what
 way has this money
 been expended?

A Jt says that 100
 millions have been ex-
 pended

Mr Dibble Refer to those
 mines with which he
 has been specially con-
 nected

Mr Stuart Well it seems
 to me that it was under-
 stood that this witness
 was not to testify to
 what he did not know
 of his own knowledge

So I suppose that he would not have testified to the expenditure of 100 millions unless he was particularly well acquainted with the facts.

The Court The question now is, not as to how much money has been invested in this class of mines, but as to how much has been invested ~~with~~ⁱⁿ mines: with which he has been specially connected.

Mr Hart How much do you want us to admit? We will admit about anything.

Mr Dibble If you will admit that 4 millions of dollars have been expended on two mines, we will accept the admission.

Mr Goodwalader I supposed that one of those is called the Milton and the other the North Bloomfield

I cannot conceive how the fact that certain persons have invested a large amount of money in these two mines can affect the this controversy between the people and the Gold Run mines. Of course those mines are not in this divide. And there are a thousand circumstances which may have entered into their expenditures there which don't affect this case. That expenditure might have been made by half a dozen sets of stockholders.

Mr Hart State the question again Mr Wibble? or let Mr Smith state the question.

The Court There doesn't seem to be any objection.

Mr Hart I don't see any use in this kind of testimony.

The Court I suppose it is

addressed to the point
of showing the extent of
this industry

Mr Start we will admit
then that it is a great
industry, if that is all they
desire

The Court Admissions are
very good when they are
accepted on the other
side, but the Court can-
not compel the other side
to accept them I under-
stand that they do not
think your offer of
admission is sufficient

Mr Wibble Answers the
question A In the
Bloomfield and Milton
mines, with which I
have had a great deal
to do, the expenditure
has been for Capital
account up to the present
time \$4,079,321.62

Mr Start State that again
A \$4,079,321.62
That money has been ex.

expended in the following
 way: the development
 by four long tunnels; one
 of which alone cost
 \$550,000. Of mines and
 cost of mines, \$1,864,323.31
 Reservoir and Canals
 \$1,382,018.67 Sundries
 such as interest on bor-
 rowed money &c &c. —
 \$733,424.57. Machinery
 and Supplies 99,555.07
 making in all \$4,079,321.62

I also have a special
 knowledge of a large num-
 ber of mines. I might
 name a few of that class.
 To show that the Milton
 and Bloomfield are not
 the largest with which
 I am acquainted. Eureka
 Lake has expended about
 2 millions and a half
 of dollars. Excelsior
 2 millions 857 thousand
 166 dollars and 55 cents
 The Foster Mtn has
 expended about 2 millions.

of dollars. The Gold Run Company have expended about 433,000 exclusive of interest, and I could name a great many other mines if you wish me to testify. I suppose you speak of your own knowledge when you speak of these amounts?

a I know that these amounts are correctly stated; — which I have given; — I know it from my own knowledge of the properties

testify It would be very much better to state the profits exactly then, if this evidence is to go in

The Witness I spoke of the properties. I did not say "profits"

testify Well, if you please, I will say that from this time forward I am willing they should prove any thing in relation

to this matter but I am
 going to insist that they
 prove it by competent
 evidence. This Witness is
 not to be permitted to
 sit down and make cal-
 culations which are
 mere deductions; and
 thus get this matter into
 the record. I think the
 whole thing is immaterial
 and improper. Of course
 when he states in answer
 to the question, the amount
 of profit in proportion to
 the amount of expenditure
 he states a deduction;
 and in that way gets it
 into the record.

The Witness I have stated
 nothing in regard to profits.
 It has been the capital
 cost of these properties
 that I have spoken of.

Mr. Noble State the an-
 nual products of gold
 from the first two mines
 you have mentioned; from

the Milton and the Bloom
field

Mr Bradwalader he object
to it as immaterial

The Court If he knows
he may state

a I could not give it
exactly but I know it ranges
from \$700 000 to \$900 000
a year. That is between
those figures. That is I
understand you to ask
me in regard to the Bloom
field and Milton Companies

Mr Dibble state if you are
able so to do, the amount
of gold still remaining in
the gravel deposits

Mr Bradwalader he object
to it as a speculation

Mr Dibble making your
estimate depend on the
production of the past

Mr Stuart The Court can
calculate that if he will
do so

Mr Belcher It would be
always competent for me

who was himself acquainted with the land and its production to make an estimate of its value. Here it is acquaintance and practical acquaintance with these mines. He knows them. He knows their character. He has examined them. And he is best qualified to give at least an approximate valuation of what there is remaining and that all that we ask is to know approximately what is the value of that which remains there to be mined out, if the mining is permitted to be carried on.

Mr. Caldwell If a lying preamble were to be constructed, or if a speculative preamble were to be constructed - I will retract the other word - there might perhaps be reason for this. But to

go under these mountains,
 to know the character of
 these river channels, to
 estimate them by the
 acreage, is the purest
 speculation in the world
 And it ~~being~~ nothing but
 speculation, it is of no
 service in reference to
 any issue in this case
 And it don't make any
 difference whether this
 material that they wash
 down into this river had
 any gold in it or not.
 And it don't make any
 difference what other
 persons state in regard
 to the contents of the
 material that is left
 If a farmer thought that
~~the top of~~ his farm was not quite
 as good as the underlying
 strata and should claim
 the right to wash the
 surface stratum off
 into his neighbor's land,
 proof of the superiority

of the lower strata for the purpose of farming would be clearly irrelevant. This not only goes into the region of speculation, but it goes into the wildest speculation imaginable; - crossing hundreds of miles of Country, and requiring the witness to look magically into these ^{great} ~~large~~ deposits.

The Court I don't see any great value in such testimony.

Mr. Bradwalader The tendency is to weigh down our case with extraneous considerations.

The Court I suppose it is to be presumed that money would not be invested in this enterprise any more than in an agricultural enterprise, except with the expectation of ultimate profit. I don't know that there

is any particular value
to be attached to this testi-
mony that is offered

Mr Becher Then the Court
excludes the testimony?

The Court I doesn't seem
to me to be of sufficient
importance to warrant its
introduction

Mr Goodwalader That is
it is inadmissible

Mr Becher We say here
that we start out with
this proposition — which
is a different proposition
from any that has ever
been presented to a Court,
so far as we know; that
here is a great industry;
embracing one third of
the Counties of the State;
pretty nearly one third
of the area of the State
— The Court (Intg) I would
rather allow the Answer
than have a discussion
in regard to it.

Mr Goodwalader We except

< The Reporter reads last question >

The Witness The only way in which I can make such a calculation is by a knowledge of the facts — a knowledge of what the production of these channels has been in the past, where they have been worked as an illustration: on the gravel ridge between the middle and the Double forks of the Yukon River — of which I have given a description — I can tell there from past experience, in that extent of the channel, within 5 per cent. or 10 per cent. probably within 5 per cent, certainly within 10 per cent — of the amount of gold that will come out there in the future. It is not guess-work, where the examination has been sufficient. The

matter is as certain as
 the estimate of a geologist
 or an engineer in com-
 puting the quantity of
 coal that remains in a
 coal field that was par-
 tially worked. I find that
 the gold that was in those
 ancient rivers is generally
 about uniform in its ~~general~~
 yield. Each mile or half
 a mile is composed of
 about the same material
 as the next half mile,
 and by having a thorough
 knowledge of the particular
 locality, the engineer or
 expert can give a very
 exact estimate. Now then
 I should say in answer
 to the question: that
 there is certainly much
 more gold remaining in
 these gravel channels
 than has been taken out.
 Very much more
material you think that
 there is more. A very

much more

Mr Dibble State the figures

A In rough numbers
about ^{1,200} ~~500~~ millions of dollars
were taken from the Cali-
fornia mines. Certainly
very much more than that
is remaining

Mr Starr We made an
objection here to the question
as to the source of this
Capital; and the Court
ruled in our favor; as I
am well satisfied that
it should have ruled. I
now withdraw that objection
I desire to give them all
the latitude they mean

Mr Belcher Then the
offer we made would be
withdrawn

Mr Dibble From ^{what} source
has this Capital been
derived? That has been
invested in these mines?

A It has been derived
nearly altogether from
California Capital

The only foreign Capital
 and by foreign Capital
 I mean capital from
 outside the United States
 — invested in our mines
 is, in the gravel mines;
 the Bonanza mine in Sierra
 County and the Blue Tent
 in Nevada County, the
 Birds eye Creek mine in
 Nevada County, the
 Gold Run, limited, in
 Placer County. I think
 there are only 4 gravel
 mines now worked which
 are owned by persons
 outside of the United
 States or by foreign capital
 ists. In the quartz mines
 there are the Sierra Buttes
 the Plumas Empire, the
 Placerville, and one or
 two other small mines
Mr Leachwalder What
 do you call the Placerville
 mine? A A small mine
 near Placerville
Mr Noble O How many

gravel mines are there in the State of California?

As there ^{are} an enormous number of them, a good many hundreds.

Mr Becher A good many hundred? Ayes sir. I would have to make a calculation in order to say how many hundred there ~~were~~ are.

O Then will you make a calculation so that you can answer the question when you come upon the stand after the adjournment this evening? A very well.

Mr Caldwell That is of your own knowledge. The Witness I have seen many hundreds of them.

Mr Noble What is the population of the Counties of the State whose inhabitants depend directly or indirectly for their subsistence

on the mining industry?

Mr Hart If you know?
You had better ask the
Witness first if he knows
The Court I suppose we
can get the Census
Reports can't we

Mr Belcher This simply
puts the matter in a
convenient form

Mr Caldwell It puts
it in a form that weighs
most against our case.
all these speculations
are incompetent and
irrelevant

Mr Wibble . There are
many countries that are
partly mining and partly
agricultural countries
The Census shows the
entire population without
this reference to the div-
ision of the people

The Court I understand
that you ask as to the
population of the mining
Countries?

Mr Double of the Counties
where the people are
dependent on the mining
industry

The Court I suppose we
can get the population
of the Counties from the
Census Report

The Witness Shall I
mention the Counties
alone or the population?
The Court Mention the
Counties only?

A Inyo, Mono, Alpine,
Mariposa, Tuolumne,
Calaveras, El Dorado,
Placer, Nevada, Sierra,
Plumas, Trinity, Shasta,
Del Norte and Siskiyou.
and about one fourth of
Butte County. And
about one third of Yuba
County. And there are some
rich mines in Sacramento
County, in the mining
districts which are not
included. There is also
extensive gold mining in

a portion of Stanislaus County. On the other hand the lower portion of Shasta & Placer are agricultural that will offset Butte County.

Mr Dibble O What is the aggregate population dependent on mining in the Counties named?

Mr Badwalader We object to that.

The Court Do you mean parties engaged in mining only or their families also?

Mr Badwalader They take in every thing.

Mr Dibble It is the aggregate population dependent upon mining on that industry.

Mr Badwalader Which leaves the Witness to judge of the proportion of the population dependent upon this Industry. It is not a fair way of examining

The Witness

Mr Dibble No objection can be raised to the question. They can cross examine the Witness on all these points. These interruptions are becoming somewhat offensive

Mr Caldwell Well I object and I have a right to object in spite of Mr Dibble. I object that this calls upon the Witness for information as to the proportion of people in each County dependent upon the mining industry. That is speculation; and he can't possibly state in regard to it of his own knowledge

The Court I think the matter is somewhat remote. I think probably you have gone far enough in that matter

Mr Dibble 200 I understand

the Court permits me to ask that question?

The Court No sir. I suppose the Court can look up the Census Reports of the population is to be inquired into Mr Dibble The Census states the entire population. It does not state what proportion is engaged in or dependent upon the mining industry.

The Court If he knows the relative proportion of men engaged in mining and agriculture from his own personal experience and observation, he can state

The Witness I have been in nearly all the Counties which I have mentioned. I know that in most of those Counties that I have mentioned the population depends entirely upon the mining industry.

Because I know that what agriculture there is is conducted for the purpose of supplying the wants of that mining population. So that the population is entirely a mining population, or dependent upon the mines. Inyo County for instance, is a County that is not anything but a mining County. There is not a soul ^{that} in that County does not depend on mining for a subsistence or bread and butter. Inyo County is on the other side of Sierra Nevada.

The Witness <Continuing>
And in Nevada County, which is the largest of the mining Counties and where there is considerable agriculture, the same is true. Practically, every inhabitant in Nevada County depends upon mining for his subsistence

Mr Noble State if you know, whether in any other portions of the State the population is dependent on this industry?

Mr Belcher Before the last question is answered we desire to make an offer to prove by this witness that more than 120 000 of the people of this State are directly dependent upon the mining industry.

Mr Hart The Court will allow you to prove that by this witness if he knows, of his own personal knowledge.

Mr Belcher I understood the ruling to be the other way.

Mr Hart The Court told the witness that he could answer, if he knew of his own knowledge as to the proportion of the population dependent upon mining.

The Court Mr Leadwader put in an objection to the question.

Mr Leadwader I didn't understand the situation.

Mr Belcher We make the offer to prove that over 123,000 people in this State are directly dependent upon the Mining Industry; in the Counties that have been named by this witness.

Mr Hart In that do you include stock gamblers?

Mr Belcher You can include what you choose. I am making the offer.

The Court I understand that that is objected to.

Mr Hart Ask the question.

Mr Wilson California miners are not stock jobbers.

Mr Hart Many men in San Francisco depend on stock gambling.

Mr Dibble Yes Sir and San Francisco has been built up by the mines.

Mr Start Ask your question

Mr Becher If they with-
draw their objection we
shall withdraw the offer
and ask the question

Mr Cadwalader Ask the
question first

Mr Becher We understand
that the question was
ruled out once substantially
so we made this offer.
So if the objection is
withdrawn the Reporter
may read the question

Mr Start As far as I
am concerned I have no
objection. I don't know
that any objection has
ever been made.

The Court The objection
was made by Mr Cad-
walader.

Mr Start I suppose Your
Honor will allow the testi-
mony to be given?

Mr Cadwalader I will
state that I did not
understand the situation.

and I don't yet

Mr Hart I understood Mr Cadwalader to suggest that this was a matter of speculation on the part of the witness; — something he could know nothing about definitely I understand Your Honor to rule now that the witness may answer to the extent of his knowledge

The Court It is embarrassing to the Court not to know what is the wish of the management on the part of the plaintiff. I cannot rule in favor of one Counsel for the plaintiff one way and in favor of the other Counsel the other way. The question is whether the plaintiff objects to this matter

Mr Dibble I understand that the leading Counsel for the plaintiff has no objection.

Mr. Badwalader I will say that I think that under your Honor's ruling they are entitled to an answer to this question.

The Court Then you withdraw the objection.
Mr. Badwalader I have made no objection.

The Court That is equivalent to withdrawing it.

Mr. Badwalader Of course when the door is opened they are entitled to insist upon an answer to their question.

Mr. Dibble Q What is the aggregate population dependent on mining in the mining Counties which ~~upon~~ named?

A The aggregate population of those Counties is 127,858 by the last Census of 1880.

Mr. Stant You speak from the Census Report?
A Yes sir.

Mr Hart That is not competent. The Census is the best evidence

The Witness Allow me to finish. I have stated before that in two of these Countries, at any rate in considerable portions of them the people were devoted to purely agricultural pursuits. But they were offset in my judgment by the populations dependent upon mining in the counties of Butte and Yuba and Sacramento and Stanislaus

Mr Belcher Give the results then as to the number dependent on mining

Mr Hart If he speaks from the Census, I think the Census is the best evidence

Mr Belcher The Census gives the number of people in these Countries but not the number of those dependent on mining

The Court. What is the total number? A. 127,858 is the total population by the Census of 1880 of Inyo, Mono, Alpine, Mariposa, Moultrie, Calaveras, Amador, El Dorado, Placer, Nevada, Sierra, Plumas, Butte, Shasta, De Norte and Siskiyou Counties.

2. And that number depends on mining?

Mr. Cadevalader He does not say that—

2 What is the number?

A. I will state that in this list is ^{not} included the population depending on mining in Sacramento, Butte, Yuba and Stanislaus Counties where there are a very considerable number and a very considerable amount of mining done. In Placer and in Shasta Counties there is a very considerable amount of agriculture and one offsets the other so that practically no man can be perfectly exact as to that, but I should say that of the total pop-

valuation of the State there are
fully 127.000 depending upon
mining

Mr. Dibble Mr Reporter will you
read my question -

The Reporter reads - State if
you know whether in other
portions of the world gravel
channels exist and the method
of working them with reference
to the methods used in working
gravel channels in California

Mr Hart. Do you include all
kinds of mining in that?

A All kinds of gold mining
- or mining for precious metals

Mr. Dibble Mr. Reporter will
you read the question again?
Reporter reads. -

Mr Hart. I wish you would
separate that question. The
method of working them we
object to, but the fact of the
existence of gravel channels
we do not object to

Mr. Dibble We want to
show that the same methods
are pursued mostly that are

pursued here.

Mr Belcher And that from the Earliest history of gold mining there never has been any other method.

Mr Hart It might be that the fact of the existence of gravel channels at other places in the world would have a tendency to establish Mr Smith's theory with relation to the existence of these channels. But as to the methods of working I think that is irrelevant and immaterial.

The Court. The only question I suppose probably as to the method pursued here, is that it is a well established method known all over the world and that it has been used for all time and is not a new method and that therefore they will probably agree that it is not a nuisance. I suppose that in the points of the question probably Mr Hart The question goes to the present existence of

Channels in other portions of the world, and if they will separate the question we will not object to that part of it. They have put two questions in one, one of which is immaterial and the other may be material, and while they may rely upon the one proposition in this Court it is not an unusual thing for Counsel to rely upon an entirely different proposition in another Court.

The Court. The objection then is to proving the method of working

Mr Hart. The objection is that it is irrelevant and immaterial in so far as the question is directed to the method of working gravel mines in other parts of the world

The Court. I will allow you to pursue the inquiry for the one purpose of showing that the alleged industry is not an unusual one, if that is the object

(2)
Ex

Mr. Hart. Excepted to the ruling of the Court.

The Reporter read a question again. The witness In Russia and in Australia the existence of similar gravel channels to those in California is known. In Australia these gravel channels are generally below the surface of the present drainage of the country and there therefore the only method possible of working them is by drifting. In Russia which produces now some \$6,000,000. or \$27,000,000 a year —

Mr. Hart. Moved to strike out the latter portion of the answer relative to the product of the Russian mines and it was stricken out.

The witness In Russia 9/10 or about 9/10 of all the gold which has been taken out, has been taken out by the hydraulic process, similar to that practiced in California. They have not yet in use —
Mr. Cadevalader. The witness

is not now confining himself to the question. He is now speaking of the amount of gold taken out of these deposits and he has not been questioned on that subject at all.

Mr. Dibble I am only speaking of the method.

Mr. Caldwell I move to have that stricken out.

The Court. It does not seem to me to be necessary to delay the Court with this proof.

I am told that hydraulic mining is described by Pliny. All that is a matter of history and that takes it back to the Christian Era.

Mr. Belcher I suppose it is a matter of history but I think it is proper for a witness who is on the stand, who has gathered together and studied facts of history, to state them without putting the Court to the trouble of consulting the books.

The Court. It may be the

Shorter method, but if an objection is made I think it would be better to bring in the works. It is a matter which the Court is supposed to know and I suppose the Court can be informed by reading the books. Mr. Dibble Proceed with your answer.

A They have not in use there the latest improvements in hydraulic mining which are now being used in California. They have some of them and the process of mining in Russia, in Eastern Siberia, is exactly the same as that which obtains in California in the hydraulic mines. 9/10 of the gold which is produced in Russia or about 9/10 of it, comes from gravel deposits similar to those in California.

I mention any other countries where gold is abstracted by the same method. If so, state them?

Mr Hart. Subject to the

question on the ground that it is leading

The Court. That can hardly be said to be leading - "Are there any other countries?"

A. There are no other countries which I am aware of where gold channels, similar to these ancient river channels of California exist

Q By what methods of mining has gold been abstracted from the earth from the earliest time up until the present date

Mr. Hart. I object to the question on the ground that it is irrelevant and immaterial Mr. Dibble It is simply to show that the thing has always existed this way

The Court. I think we can refer to the Encyclopedia for that

Mr. Belcher. We offer to prove by the witness, and expect that he would testify if allowed to, that the very method pursued in California

at this date in the matter of mining in these ancient river channels has been practiced from the very earliest times of history and throughout all the regions of the world where mining has been conducted.

It was so in Africa it was so in Europe, it was so in Asia. Southey has mentioned Pliny as stating the same matter —

The Court. No! I said that I had been informed so.

Mr Belcher Herodotus mentions the same matter, and mining is mentioned in the Bible although nothing is said there about the way in which it was conducted.

Mr Rhodes. Giants are mentioned there.

Mr Belcher. Giants are mentioned, but probably they were not of the same size.

Mr Hart. I do not think they can prove that. I prefer to take Mr Belcher's opinion.

I think we could save time
by proving the authorities
The Court. No witness can know
more, than The Court is sup-
posed to know already about
the authority of Herodotus,
whether The Court in fact,
knows it or not

Mr Hart, They have a right
to prove the text-books
The Court. But these are not
text-books

Mr. Belcher I take it that the
Statements made by Herodotus
or in the Old Testament
would be accepted
without any further
definite proof of the
character of the authors
The Court. Do you object
to this testimony

Mr Hart I do not
know that I do

Mr Dibble. Mr Reporter will
you read the question
Reporter read

{

The Court. Answer the question

A. What is the question?

Mr. Debbles By what method of mining has gold been abstracted from the Earth from the Earliest time up until the present date?

A. I suppose that 99/100 of the gold has been taken out by hydraulic process

Mr. Hart. I move to strike that out as not being responsive to the question. The one is as to proportion and the other as to time. The answer is as to the proportion, and the question is as to time

The Court. What do you say as to the time

A. From the Earliest historic time up to the present day

Mr. Cadwalader That embraces the gold that the Queen of Sheba laid at the feet of Solomon?

A. I think it does

Mr. Debbles State what the product of the gold of the whole

covered is at the present day and whether or not that product is increasing or decreasing?

Mr. Hart. We object to it because we think it is irrelevant and we think this Examination has gone far enough.

Mr. W. C. Belcher For the purpose of preserving the matter in the record I will make an offer, and say that we offer, and expect to prove by the witness if allowed to testify, that the annual product of gold at this time is about \$96,000,000 per year, and that it has been steadily decreasing since 1852 and 1853 when it was \$170,000,000 per year and that California has produced — I am not sufficiently advised to state the exact proportion, but we will fill in those figures when advised if the Court allows — as to the proportion produced by California, and that product by California during all this time for the

last ~~ten~~ years has been 20,000,000
 — I would prefer that we
 should get the exact figures
 and state that for the last 10
 years it has been from 18^{000,000} to
 20,000,000, and for the 20
 years preceding that \$65,000,000
 per year

The Court. I presume they will
 admit that

Mr Hart. I will not object to
 any offer. I will object to
 their questions if they pro-
 pound them

Mr. W. C. Belcher. If they withdraw
 their objection to the offer they
 will not be heard to object to
 the proof. We have taken an
 exception to the ruling of The
Court and then we offer to
 prove by the witness that
 which we have just stated.

Mr Hart. We object to their
 proving the amount, upon
 the assumption that whatever
 amount they may prove or
 whatever increase they may
 prove, would be immaterial

The Court. Let it stand in this way, that the offer accompanies the question and points the objection to it. I think I will give you (defendants) the benefit of an Exception, if they insist upon the objection.

Mr. Wallace. The offer we made was objected to on the other side.

Mr. Hart. It was not. We objected to the question.

The Court. The record will show that that question was asked and objected to, and in connection with that you make the offer; then the objection is not withdrawn, and not being withdrawn is sustained, and that prevents you making the proof.

Mr. Wallace. Your Honor Excludes the testimony?

The Court. I exclude the testimony, and you Except.

Mr. Dibble. During the last ten years what has been the annual gold product of

Ex

Ex

California? A. It has varied, it was the least in 1877 when it was \$15,237,729. It has been largest during the past year, therefore ranges between fifteen and a quarter million to twenty million.

Mr Hart. In the last ten years? A Yes sir

2. Ranging from fifteen and a quarter million to twenty million? A So nearly twenty million

McAdowalader That is California alone? A Yes sir, California alone

Mr Hart. I suppose you speak from knowledge?

A What I consider knowledge yes sir.

Mr. Dibble state whether or not it is practicable to work the hydraulic mines of California by any other process, than the process now established?

A. I do not think it is, in the mines which have been worked by the

hydraulic process now. I do not think it is practicable to work them by any other process with profit. There might be a few exceptions, there are two or three mines with which I am familiar where some profit could be made in working ~~them~~ the lower portion of the gravel strata by drifting. But I do not know of any mine in California now being worked, any hydraulic mine which would make as much profit if worked by any other method as it does now when worked by the hydraulic process.

2. Have you made a careful examination of the mines of the defendant in this action, The Palo Verde Ditch and Mining Company?

A. I have made a pretty careful examination of that.

Q. When? A. The most careful examination I have ever made of them was

this year.

I state the manner in which these mines have been worked in the past. The character of the latest mining, and the character of future mining should work be resumed on them? A. In the past the great portion of the mining done in the Gold Run Mining District was washing surface gravel: that surface gravel I have described before. That was run off with steep grades and a very large amount has been washed. By my direction Mr. Uren made a plan of that. You have heard his testimony before in regard to it, and my estimate comes agree from what I know of the mines there with his, which was some 67,000,000. of yards of surface gravel washed off. The mining for the past few years has chiefly been done through the deep tunnel driven by the

Gold Run Ditch and Mining Company.
I have made my self a little
Section, a sketch of the mine
that aimed illustrate the washing
there, in the past, present and
prospective. It is a rough
Sketch showing the mining
district there. (Submitting
Sketch to Counsel)

Mr Hart. When did you make
this? A I made it a
month or so ago, I have
forgotten, I do not know
whether I have dated it

Q Before or since the com-
mencement of this suit?

A Since the commencement
of this suit

Q Since the commencement
of this trial?

A No, before the commence-
ment of the trial - I forget
when

Q Did you make it from any
measurements? A No sir,
it is a rough sketch. It is
made from a plan of the
mine which I saw

and sketched a rough form
that

Mr. Dibble Where did you make
it? A. Inside this
at Geo Run

Q. Explain it to The Court and
give the figures?

A. The surface washing has
been over a surface of over 500
acres, I estimate that it
was about 13,000 feet long
and an average of 1800 feet wide
and 75 feet deep. This would
give an aggregate of 65,000,000
Cubic yards, about that
Mr. Cadwalader That is in de-
pendent of the pit?

A. That is independent of
the pit, and I estimate that
in this old surface washing
that an inch of water would
mine about 9 yards per acre.

Q. How is that?

A. I estimated that, that of
that old surface, washed
through the sluices with steep
graders which were in use, that
each miner's creek would wash

about 9 yards, so that about
 7½ million 24 ~~thousand~~ inches
 of water, had been necessary
 to wash off that surface gravel.
 I examined that pit and as Mr.
 Uren states, by my direction
 he made a survey of that, show-
 ing that with the adjoining
 pits that 4,389,791 cubic yards
 of material had been washed
 out of those several pits
 Mr. Hart. The witness is stating
 what Uren has stated and
 what his map showed. His
 map is here and it is the
 best evidence

The Court. I suppose that is
 merely preliminary to some-
 thing.

A. Mr. Bonshy surveyed the
 same pit and estimated that
 4½ million yards, which is
 not very much difference,
 practically it is about the same
 thing.

The testimony is objected to
The Court. Go on, and con-
 fine yourself to your own

Calculations.

A. If you will allow me to say so, an Engineer who has Charge of works, it is impossible for him to state from what he knows exactly, any thing. He has subordinates who do the work for him, and he trusts to their judgment and the facts that they present to him, and he draws his deductions himself from them, and that is the only way to arrive at any deductions.

The Court. Draw your deductions from their figures then.

A. That is what I was trying to say.

The Court. It is unnecessary to state their calculations over again merely for the purpose of stating them.

A. Shall I continue Mr. Dibble continue your computations.

A. What I want to get at, is this; I want to show how much material was washed

in that pit, by a miner inch of water, and therefore it is necessary for me to have some data to base an estimate upon Mr. Hart. That is a mere matter of mathematical calculation.

Mr. Dibble Proceed. The Court has so directed.

A In the Excavation of that pit there are 1.124.367 twenty four hours inches of water used Mr. Cadwalader How do you find that out?

A I know that from the water books of the Gold Run Ditch & Mining Co.

Mr. Hart. That is not within my knowledge at all and I object to it.

Objection overruled and plaintiff Excepto

A. From these figures I say that each miner inch of twenty four hours in mining that pit washed a little less than four cubic yards per miner inch Mr Hart. I move to strike

(Ex)

that out as being incompetent

The Court denies the motion
and plaintiff excepts

Mr. Cadwalader What is that
figure? a a little less
than four yards per miner inch
for twenty four hours. In ref-
erence to the future washing
of the mine I estimate myself
as follows; I think that work-
ing the mine to the best advan-
tage - I would like to make a
section of how I think the
mine should be worked to the
best advantage hereafter and
the material that should come
from it (makes pencil sketch)
That section illustrates roughly
what the future working of
the mine will be. We find
in working this bottom channel
of gravel, that it never ^{pays} ~~fails~~
to take out the entire width
in the bottom - all the bottom
ground. There is what is called
the pay lead running through
the bottom gravel almost
universally, in fact, I never

(Ex)

Noticed an Exception, being
 poor on further me side or
 the other and with the pay
 in a narrow ribbon compar-
 atively, and the Skilful miner
 therefore after he finds out
 where his pay lead is, con-
 siders his working to that por-
 tion of the bottom that
 contains the pay.

Mr. Cadwalader That is he might
 do it? a He does do it

Mr Dibble What is the width
 and depth of the pay ribbon
 in the channel?

A. I should estimate that
 it would be about 600 feet
 wide on the top, 300 feet on
 the bottom and 125 feet av-
 erage depth, extending from
 the present pit of the Gold
 Run Ditch & Mining Company
 up to the Railroad. That
 would be my estimate, up
 to where the gravel channel
 crosses underneath the rail-
 road

Q What is the full length?

A The total length to be worked as I measure it on the plan is about, very nearly, 11,000 feet.

Mr. Cadwalader That is to be worked? A To be worked, yes sir.

2. Six hundred feet wide at the top? A 600 feet at the top, 300 at the bottom and 135 feet deep. That would give for every foot which is worked upon the Channel an Excavation of about 2000 Cubic yards, so that if this 11,000 feet is worked out, that result will be about 22,000,000 yards by my calculation.

Now, the speed with which that mine can be worked I cannot estimate at over 300 feet a year, that is about all the speed which the miners can make there.

Mr. Hart. Three hundred feet a year? A About 300 feet a year upon the Channel.

Mr. Dibble On that basis how long would it take

Q. On that basis it would require about 37 years to wash out the entire channel and each year would result in an excavation of about 600,000 cubic yards.

Mr. Hart. That 600,000 cubic yards I understand you to mean an amount from the excavation of this Grosvenor mine.²

A Yes Sir.

Q Within that pit?

A As they work through that tunnel. I estimate that each miner dig of twenty four hours which is used in that mine hereafter will wash about $3\frac{1}{2}$ yards, possibly less than that but I think not over $3\frac{1}{2}$ yards; it would depend a good deal upon the kind and character of the material, but with the character that they have there now I should say under $3\frac{1}{2}$ yards. In the past the excavations have been at the rate of 4 yards to

Each inch, but the future Excavations, as I have seen them there will be less in depth than the past have been.

Mr. Cadwalader. How do you judge of the past?

A. I can judge from an Examination of the pit

2. You do not know what they have been in the past.

(No answer)

Mr. Dibble What is the miner's method of measuring water and how much water does a miner's inch in 24 hours represent?

A. The miners in California have followed the same method in measuring water which prevails in Italy and especially in Spain, that is having an aperture of a certain size and representing a certain number of square inches cut in an upright or a vertical plank which forms a portion of a confined box, the water discharges under

a constant pressure through that aperture, and the amount is estimated by the number of square inches of the opening and in California as a general thing the miner's inch is an opening 50 inches long, 2 inches deep and with 6 inches pressure above the top of the opening, and that represents the area of the water discharge of 2×50 Equals 100 and such an opening would be equal to 100 miner's inches of water which was discharged through that opening; if you wish to measure 50 inches you would reduce the area to 25 inches in length by 2 inches in depth; if you wished to measure a larger quantity of water you would have quite a number of openings; if you wished to measure 500 inches of water you would have 5 openings such as I have described. I have made

Some of the most careful measurements which have been made in regard to the quantity of water discharged through such an opening, and a miner's inch, through such an opening as I have described is Equal to the flow of 2260.8 Cubic feet in the 24 hours.

The Bloomfield & Melton Companies and Eureka Lake Companies use a different sort of aperture. The small apertures are very inconvenient and *costly* where you wish to measure large quantities of water and we have adopted an opening $12\frac{3}{4}$ inches wide and 12 deep and 6 inches pressure above the top of the opening. A miner's inch measured in that way is Equivalent to the flow of 2179.4 Cubic feet for 24 hours. These measurements were made by me with very great care and are within a very small percentage of the truth

Where you have a number of openings together the discharge will probably be a little larger and I therefore have assumed that a miner creek roughly is equal to the flow of 2230 cubic feet in 24 hours and that figure has generally been adopted through the State by people in writing or talking about what a miner creek is.

Q. State the difference between the top or surface gravel washed in the Gold Run mine and the lower or bottom gravel yet to be mined?

A. As it is in other portions of the ancient channel the top or surface is of light gravel, red at the top where it contains some of the soil sometimes, three four or five feet of soil on the surface sometimes none, sometimes 10 feet of soil or 20 feet of soil, varying; then you have fine gravel sometimes red, but generally white

And that gravel occasionally contains very large bones and a great many of them. In the Goose Run district it contains but few bones. The lower gravel gets harder and becomes pretty firmly cemented as you go down in depth; the lower you go down as a rule the heavier the gravel is, the proportion of large bones becomes greater and the more firmly these bones are cemented together by sand which occupies the interstices between them.

I state whether or not pipe clay is quite characteristic in the bottom gravel?

As a general thing pipe clay is not found in the bottom gravel, but immense deposits of it in the upper gravel often, but in the bottom gravel it is a rare thing to find it.

I know it is in the Goose Run mine. A At the Goose Run

mine there is some pipe clay, there is some caving off on one side so that I could not see exactly but I think there is some pipe clay on the East run down toward the bottom but not on the bottom I should judge - on the west run of this pit, the extreme west run, there are large bodies of pipe clay.

2 How much of this bottom gravel will a miner wash of water, 24 hour wash.

A It is pretty hard to tell. No matter how skillful and how much knowledge a man has acquired before examining it is pretty hard to tell what quantity of gravel water will wash unless he sees the mine in operation. At the Gold Run mine now the sides in the bottom of the pit where they are not obscured by material which has caved from the surface are straight and all the material has been

washed from the pit, and a stranger going there can form no correct idea of the character of the gravel; can not tell the proportion of boulders, how big the boulders are, and one is very apt to be deceived in that respect.

You go into a mine and you look at it casually and you think there are very few boulders there, but there may be a huge amount when it gets to working, and the amount of work which a miner will do, depends very largely on the kind and the character and the size of the boulders. I have estimated that a miner with will wash about $3\frac{1}{2}$ yards of that bottom stuff, will wash that in the future, but I estimate that a good deal in reference to what the water has done in the past, which I know to be about 4 yards for well as I have stated before.

Q. Where would the material washed be deposited?

Mr Hart. That is a matter of speculation

Mr. Dibble would it be deposited at the dump and then washed away

Mr Hart. That is not a matter of Expert testimony

The Court. If you can tell from what you observed at the mine, go on?

A. I think it does not require a very brilliant person to discover where it is deposited. It is washed out through the tunnel into Cañon Creek, and by the great grade of Cañon Creek it is carried down into the North Fork of the American River

Q. I state whether or not the material washed from the lower stratum of gravel or any portion of it will be permanently lodged in the bed of the North Fork of the American River?

A. A portion of the heavy material

which is washed from the
 present bottom stratum of
 gravel for ~~which~~ which is being
 washed now at the Gold Run
 mine will unquestionably find
 a permanent lodgment in the
 North Fork. How much that
 will be I am not prepared
 to say. I think it would
 require careful examination
 of the river to determine whether
 or since that mine has been
 at work on that bottom grav-
 el, how much the deposit
 has been, that is the proper
 way to solve that. I am
 not sufficiently acquainted
 to be able to say what
 proportion, but from my ex-
 perience especially in other
 places, I know that a con-
 siderable portion of that heavy
 material will remain there.
 The best evidence is that there
 is a great deal of material
 in the North Fork of the
 American River below Canon
 Creek, there is a large &

Amount of material which has remained there and it seems to be very firmly bedded.

Boulders of considerable size, pretty close together and with spaces between them filled with sand just as they were before they were washed out of the gravel beds.

2. State if such comes in the case with material washed from the upper strata of surface gravel such as has been in time passed washed from the Gold Run mine?

A. The material which I have seen there in times ^{past} ~~has~~ and which I know constituted the upper strata in the Gold Run mines is of a very different character, entirely different from that which they are mining at present. It is very light indeed and as I said before, very few boulders of any size but light gravel, a material which the river flood comes very easily transport and carry off

I need see enough in my examination of the North Fork of the American River to see that certainly a large proportion of that gravel that has been washed from the surface washings had been swept down the river, so that only a very small percentage of that surface material comes remain above Rice's Bridge.

2. State what knowledge you have in reference to the permanent lodgment upon river beds of such material as you have described, comprising this bottom gravel?

A I examined several years ago very carefully the dump of the Polar Star mine - especially the Polar Star mine at Dutch Flat and that is a mine worked on the same channel as the Gold Run mine and only 4 or 5 miles distant by the windings of the channel - 5 miles - it is the same general

Character of deposit. That mine
 discharged its material directly
 into Bear River, which is a
 stream of very considerable
 size at times of flood, and
 the material coming from this
 Polar Star mine has lodged
 and made a dam in Bear
 River which must be about
 100 feet in depth very nearly.
 It has added Ishmied page
 mine 1878, that in ^{the} these years -
 it has increased some twenty
 five or thirty feet, or cer-
 tainly 20 feet. I examined
 the dam or dump very care-
 fully in 1878 and I exam-
 ined it carefully again this
 year. The material poured
 from the dump has filled
 up clear across the river
 and it was spread and even-
 ly distributed by the flood
 of last winter, because I
 think but very little mining
 has been done in this mine
 during this year; it was
 deposited evenly across and

has formed a sort of a rip-
 rap dam, consisting of heavy
 stones and with spaces between
 them filled with smaller gravel
 and with sand, another dam
 I say is about 100 feet in
 height now and stood perfectly
 the large floods of last winter
 of 1881; that dam has had
 the effect of arresting the flow
 of debris from mine above
 which has accumulated in
 depth of some 75 feet be-
 hind it, quite a number of
 mines are working above this
 dam. I may say that I was
 exceedingly well satisfied to find
 how well this dam as I call
 it had stood the flood because
 it was a matter of a good deal
 of discussion during the Keyes
 trial, and I stated there my be-
 lief that that dam was per-
 manent and would remain,
 and the experience of the
 past three years shows that
 it is most permanent

Question repeated
 A I Can illustrate how that
 has been deposited (Explaining
 diagram to Counsel) that is
 especially satisfactory in
 that case in reference to the
 permanent lodgement in the
 American River because
 the grade of Bear River is
 much larger than that of
 the north fork of the American
 above Rice's bridge and if
 material will lodge in Bear
 River I therefore ^{think} that it
 will lodge in the American
 River if the same sort of
 material is deposited because
 I know it has lodged in
 large amounts in Bear River.
Mr Cadwallader you are talk-
 ing of a lodgement at the
 dump at one place and a
 lodgement down at Rice's
 bridge at another time.
Mr Dibble No sir, ~~just~~ have
 you been on the north
 fork of the American River
 from Canyon Creek to Rice's.

bridge and if you say
Yes when

A. I have been on the
North fork of the American
River from Pickering's bar,
a quarter of a mile above
Pickering's bar nearly up
to the mouth of Canyon Creek
down to Rice bridge and
I passed over that por-
tion of the River a couple
of months ago I think
it was.

Q Give a general description
of the River as you observed
it ?

A I think I could do that
best by reading my notes
which I took at the
time I made my exami-
nation.

Mr Hart Have you them
as you wrote them at
the time ?

A I wrote them at the time

Q Those are the notes that
you are going to read

A I will refresh my memory

With these notes, you can look at them if you like. I do not care to,

A The first note is in regard to Pickering's bar, deposit of very heavy gravel in the River, gravel evidently accumulating. Then lower down was a bar in the River which is being gradually washed away. This bar was formed on the south side of the River from the washings on the high bench of gravel, high river mining as the miners call it, heavy material. The bank was being washed away evidently because the surface of the River was increasing in elevation, and in many places I noticed in going down the Canyon there were signs of old deposits of top gravel showing conclusively that when the Gold Run mines were washing this surface

gravel that it accumulated in very large quantities in the river bed, higher than it is at the present and that when the flood came it swept this deposit right out, you could find traces all along of this surface gravel, which is very easily distinguished from the present gravel which is now being washed in the last few years, I say going down the Canyon there ~~are~~ all along evidences of the accumulation of the present heavy bottom gravel, There is also evidence of continual washing away of the debris from the old high river washings Mr Hart I wish you would state what those evidences are instead of giving that as your conclusion?

A. If you will allow me to finish I will.

The Court go on and give

ground of your opinion
 A Then is also evidence of
 Continual washing away of
 the debris of the old high
 hill river workings which
 have been extensively worked
 many years since, one of
 the evidences that the heavy
 gravel is accumulating is
 the fact that these high
 river bars are washing
 away, you can see that
 from the appearance of
 the mining that mining
 had been done a great
 many years ago and it
 is only of late that they
 are beginning to wash
 away, If the River had
 been in its present po-
 sition, all those bars
 would have disappeared
 It is Conclusive evidence
 that the present height
 is higher than the general
 height of the river has been
 heretofore, in addition I
 would say that a deposit

of gravel if deposited in a river leaves marks along the river bank, as I stated a few moments ago you can see the marks of the deposit showing the great depth to which the tailings from the old surface washings accumulated - you see the marks of that gravel sometimes 3 or 4 or 5 feet higher than the present bottom, traces left along on the bank on either side, that shows just how high those tailings had accumulated in times past; looking up now from the present River bed I have found in no cases any heavy material, no trace of heavy material lodged higher than it is at present, therefore the deposit of heavy material is as high now as it ever has been

Mr. Dibble are you through?
 A No sir, I note here that
 there is a lovely place for a
 dam, only sixty five feet
 across the bottom

Mr. Hart. I object to any
 thing about a lovely place
 for a dam.

A I say going lower down
 the river there is still heavy
 gravel and ^{signs} ~~signs~~ of accu-
 mulation. I say that at Stearns
 Bridge the high water mark
 thirteen feet above the present
 general bed or three feet below
 the bridge in 1881, high water,
 it was measured on one side
 of the bridge. Now I notice
 going still lower down below
 Stearns bridge and approaching
 to Colfax, that the gravel
 in the stream is coarser but
 finer than above and I notice
 that generally as you went
 down from Pickering's Bar
 the gravel got finer and finer.
 at the upper end I saw
 boulders that would weigh

I think 200 lbs. quite frequent and coming down they get smaller and smaller until it was comparatively pretty fine gravel at Rice's bridge. Mr. Dibble Have you estimated the amount of filling in the North Fork? If so, with what result?

A. The estimate which Mr. Allen has made, were made, by my direction and I only know the results as he gave them. I directed him in what way to make the survey and how to acquire the data which I thought would be reliable in regard to the amount of that filling.

I know the data and you make an estimate of the amount of filling? A. Yes. I looked over Mr. Wren's figures from the data which he gave?

Q. And the result?

Mr. Hart. I object to that as being incompetent

Unless he shows that he has made the proper calculations. And in addition to my objection, I object to his stating the result of Mr. Uren's calculation or even basing a judgment upon the result of Uren's Examination upon the ground that Uren's Examination which seems to be the foundation of his opinion is shown to be incompetent and hearsay.

Mr. Wallace We propose to supply the proof, to establish the correctness of the data by another witness. We have proved it except in one particular and we will furnish the balance.

The Court. It is not a matter of much consequence. The testimony at last comes depend on the survey of Mr. Uren and the information which he derived from other witnesses. Mr. Uren of course will have to come back on the stand

in order to identify the information which he received from the other witnesses. As to the objection, that it is a mere mathematical proposition we have had that all the way through. Itall and Grunsky and Allard all gave their mathematical computation without objection.

Mr. Dibble We will not press it. What if you know has been the cost of the properties of the Gold Run Delch & Mining Company?

A I think I have stated in regard to that before sir.

2 What amount of gold remains in the mine to be worked out in the Gold Run mine?

A I believe that these remains yet to be taken out by mining, if mining is resumed in the Gold Run mine from the present workings of the Gold Run mine to the rail road line.

think that \$6,500,000 can be taken out from there - will be taken out

Mr. Cadwalader How much is that per yard?

A That would be about \$600. a foot.

Mr. Hart. Lineal foot?

A Lineal foot upon the Channel
Mr. Cadwalader How much per cubic yard, 5 cents?

A I can estimate it

Mr. Dibble What will be the amount and character of the material to be mined from the Gold Run mine in the future compared with the old surface workings? A I think I have stated that before, the material is entirely different in its nature, that which is to be mined in the future from that which has been mined in the past, entirely different.

2 As to the amount have you stated? A Oh! Saunders and you; in proportion to the amount, the total

Washing if the mine is worked until it is exhausted will make according to my calculation about

22,000,000 Cubic yards and it will require 37 years to wash that out at the rate of 300 feet a year. The first washing was done in a much less time comparatively when 60,000,000 cubic yards were washed, and I estimate from what I know there, that if the mine continues working in the future, that not more than $\frac{1}{5}$ part as much material will be put into the North Fork of the American River as was the case when the mines were being worked most vigorously on this surface gravel - that is when working the surface most vigorously they put in about fifteen times as much as they will in the future per year.

Q. 37 years or 27 years? A. 37 years or 36; 11,000,000 divided by 300 is $36\frac{2}{3}$ - Either 36 or 37 is correct, it is a simple approximation

Recess until 9.30 Wednesday
December 14th 1881

In the Superior Court
of the State of California
in and for the County of
Sacramento

The People of the State of California vs.	} Wednesday Dec. 14 th 1881 Morning Session
The Gold Run Ditch and Mining Company	

Transcript of Testimony
Vol.

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Hamilton Smith direct resumed 5574

Winfield J. Davis
Official Reporter

In the Superior Court
of the State of California
in and for the County of
Sacramento

The People of the State of California vs. The Gold Run Ditch and Mining Company	} Wednesday Dec. 14 th / 81 Morning Session
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Testimony
of
Hamilton Smith

direct Examination resumed

The witness If Your Honor please.
I would like to make one or
two explanations in regard to
my testimony of yesterday. I
would like to do it if I can
with your permission

The Court If there is anything
that requires explanation or
qualification you can make your
explanation

The witness In giving a list of
the mines which are owned

by foreign corporations - the
 Mines in California, I regretted
 to speak of the Isabelle and
 other associate mines in Alpine
 County. And I also regretted to
 speak of the original Amador
 in Amador County. I also states
 that it was only in California
 and Russia ~~and~~ Australia that
 the existence of gravel channels
 similar to these in California
 would be found. There are grav-
 el channels, but not very exten-
 sive ones, in Colombia and in
 Peru. They are of very small
 extent compared with those of
 California. There are also placer
 deposits in Alaska and in
 British Columbia. But they
 would not be called by Cali-
 fornia mines by alluvial de-
 posits or hydraulic gravel
 mines. And in regard to the
 Australian mines: although the
 material from the Australian de-
 posits is drifted, still it is
 washed after it is brought from
 the mine by the hydraulic process

Mr. Debbles In yesterday's testimony you stated that there was much more gold remaining in these channels than had been taken out?

A Yes sir, I did

Q. Make that more explicit by giving the figures?

A I stated that about \$1,200,000.00 in round numbers had been taken out; and that more of it remained to be taken out

Q Is it practical in your judgment to work these Gold Run mines by any other method than that now practiced?

A It is not

Q. State the reason?

A The Gold Run gravel or bottom gravel is similar to that in other mines situated on the same channel. Like that at Bloomfield and Smartsville and some other points. At these points I have looked into the drifting proportion very carefully indeed. At

Bloomfield, for instance: we
 attempted about ten years ago
 to work a portion of the mine
 by drifting; and the portion which
 we encased almost the rich-
 est part. We extracted by drift-
 ing 21,614 tons of gravel; which
 yielded \$32,000 in gold or \$1.50
 a ton. We found that there
 was not profit at all to be
 made by drifting and discon-
 tinued it. The reason of that was
 that the way that is in these
 gravel channels is not al-
 ways immediately on the bottom.
 It is not continuous. You
 sometimes find the richest gold
 immediately on the bed rock.
 In other places - within a
 few feet - it jumps up to
 a height of 20 and sometimes
 30 feet above the bed rock.
 So that it is practically im-
 possible in drifting to follow
 the rich streaks. At Smartville
 the gold is so regularly distrib-
 uted through the gravel for 60
 or 70 feet in depth

That you would have to drift out that entire amount of 60 or 70 feet. And generally along that Channel, Extending from Goose Run to Martinsville, it is impracticable to work the mine by drifting. That is, there would be no profit attending the working. And if Hydraulic mining is not allowed the mine would necessarily be abandoned.

Mr. Dibble Explain drift mining and the method —

Mr. Cadwalader What pamphlet is that from which you are reading?

A It is a report of mine concerning the Bloomfield property. I simply looked at it to ascertain the amount of gravel which we had obtained in the drifts. What is your question, Mr. Dibble?

Mr. Dibble Explain drift mining and the method of working by that process.

A Drift mining consists in, or is very similar to coal mining. Where the coal stratum is

horizontal or nearly horizontal.
 Tunnels are run in upon the
 bed rock, or just below the bed
 rock; following the course of
 the channel. Drifts are run
 off at convenient intervals on
 each side and the gravel imme-
 diately on the bed rock is
 stoped. Drifting is only prac-
 ticable when the gold or a
 very considerable portion of it
 in the channel is situated imme-
 diately on the bed rock. In
 that case the mine is known
 by miners as a drift mine.
 The gravel is hauled out in
 cars and sometimes by the
 aid of locomotives and dump-
 ed at the mouth of the mine.
 They worked the mine gener-
 ally as vigorously in the
 summer time when there is
 low water as in the winter.
 During the summer a large
 amount of gravel accumulates
 at the mouth of the tunnel
 in dumps. When the water
 becomes abundant, then

gravel which has accumulated
 is washed and washed in pre-
 cisely the same manner as the
 washing is done in by dranie
 mining. Generally they use a
 little giant, through which
 the water is discharged under
 a large pressure against these
 large piles of gravel which
 have been extracted; and they
 is washed, this material is washed
 through flumes in precisely the
 same manner in which hy-
 draulic mines are washed

2. You spoke of using the
 little giant? When was the
 little giant invented and where
 is it manufactured?

A The little giant was
 first introduced in 1869. Pre-
 vious to that time the miners
 used what was called a
 goose-neck, which resembles
 the little giant somewhat;
 but it was not nearly as
 convenient an implement as
 the little giant. The little
 giants are constructed in

Marysville, all of them.

2 What is seam mining?

A seam mine is a decomposed quartz vein, a quartz vein of very considerable thickness which is more or less decomposed, and having a nearly vertical dip.

The gravel or quartz is so much decomposed that it can be washed by the application of hydraulic pressure.

The water is brought to these seam mines. Tunnels or cut run to them, and this decomposed quartz is washed out from the vein.

2 You stated yesterday that 127,000 persons were dependant on the mining industry. Referring to the Country? State what would be the effect upon the population or upon these Counties if mining should cease?

Mr. Hart. Oh, that is a mere matter of speculation. The Court can understand that as well as he can.

Mr. Debbles It is not a matter of speculation, it is a

Matter of fact

Mr. Hart. I suppose that if they get no bread they will starve; if they get no clothes they will go naked; if they get no money, they will have to go in debt, or perish. I presume the Court can judge of those matters as well as they can or as well as the witnesses can.

Mr. Debbles I desire to add to the question: And the country be depopulated and disorganized?

Mr. Hart. That is another matter that the Court can judge of as well as they.

The Court. Do you object to the question?

Mr. Hart. We object; on the ground that it is immaterial and not a subject of expert testimony.

The Court. I think that we should hardly go into that proposition.

Mr. Hart. They might raise goats up there.

Mr. Debbles We desire to know

of the Court please, whether
 The Court rules it out on the
 ground that it is immaterial or
 the ground that it is Expert
 testimony. We wish to know
 on what ground it is excluded,
 for both those grounds are
 stated. Because of course it may
 be in some sort a matter of Ex-
 pert testimony any way. And if
 it is Expert testimony, in giving
 the opinion called for the wit-
 ness would need of course cer-
 tain knowledge in order to ren-
 der his testimony at all binding
 upon the Court. And if the
 exclusion be upon the ground
 that the witness has not shown
 himself to be qualified to testi-
 fy in that regard that would
 be one matter. If it be upon
 the ground that the testimony
 would be valueless if introduced,
 immaterial, that is another
 matter entirely, but we would
 like to know upon which ground
 it is excluded.

The Court. I suppose it makes

No difference which ground the Court considers a proper ground for its ruling when both objections are made.

Mr Belcher If it be upon the ground of immateriality then we stop there. If it be upon the ground that the witness is not qualified to answer we may go further.

The Court. They have made both exceptions at the same time and the Court may be considered as having ruled upon both grounds. Giving them and you the benefit of the ruling. Nor I may judge the question immaterial when another and higher Court may think otherwise.

Mr Belcher Then we will ask this witness some questions to show that he is sufficiently acquainted with the subject matter about which we are talking to be able to give an answer.

Mr Dibble Are you acquainted with the various countries you referred to in your testimony

of yesterday?

A. I am very familiar with most of them.

Q. Are you familiar with the industry on which they depend?

A. I am

Q. Do you know the effect of a stoppage of mining operations on that industry?

A. I think I do.

Q. As the countries and on the people?

A. I think so.

Q. Are you able to estimate the number of people so affected or to be affected or damaged by the stoppage of mining operations in those countries?

A. I think I am. I believe I am.

Q. What would be the effect on the organization of these countries if mining should be stopped? the effect upon the government of these countries?

Mr. Hart. I make the same objection.

The Court. The same ruling.

Mr. Belcher. We except to

(Ex)

the ruling of the Court please,
 And we offer to prove, and
 say, that we expect this witness
 would testify if allowed, that
 the stoppage of mining operations
 in the Counties named would have
 the effect to disorganize these
 Counties and drive from them
 nearly all their population;
 and would render them val-
 uelers, as portions, as integral
 portions of the State Government.

The Court Does the Plaintiff
 object insist on this objection
 to the question?

Mr Hart. I have made my
 objection. I supposed it was
 not necessary to make my
 objection again.

(Ex)

The Court The same ruling
 Mr Decher We except
 Mr Dibble If mining is con-
 tinued in the Gold Run mines
 how much in your opinion
 will be the resulting damage
 to the American and Sacramento
 rivers and their bottom lands
 Mr Hart. Well that is

A very large question. They may ask as to the effect upon the river. But to let them determine as to the damage ~~enquired~~ about is to substitute the opinion of this witness for the opinion of the Court.

The Court. (addressing Mr. Dibble) Probably you do not mean damage to the lands in the way of their market values.

Mr. Dibble. Inquiring as to the cotton lands on the Mexican River.

Mr. Hart. Confirming this question to the Gold River mine, too, I see.

Mr. Dibble. Let the reporter read the question.

The Reporter read.

Mr. Hart. We object to that on the ground that it is not expert testimony. And if sustained, the effect or tendency would be to substitute the opinion for the judgment of the Court as to the damage resulting.

from the particular cause in-
 created, and in regard to which
 the witness is to be required to
 testify

Mr. Debbles I change that word
 "damage" to "Effect". Resulting
 Effect

The Court. Effect upon the
 river?

Mr Debbles I also omit the
 words, "and their bottom lands".
 I omit those words for the
 present

The Witness I have estimated be-
 fore that if the Goos Run
 mines continue washing, that
 about 600,000 cubic yards
 per annum will be excavated.
 Of that, as I believe I have
 stated, in my judgment a
 very considerable proportion
 will remain in the North Fork
 of the American River above
 River Bridge. Assuming that
 even 20% of that material
 which is washed from these
 mines should come down
 into these rivers, that would

Only give a total of 120,000
Cubic yards. And the damage
that 120,000 cubic yards would
infect —

Mr Hart. {Intg} We object
to that.

Mr. Debbie We have struck
out the word damage, we simply
ask it for the effect.

The Witness Very well, then
the effect upon the river in
filling them would be very
slight indeed. You might say,
almost infinitesimally; — by
the 120,000 cubic yards.

Mr Hart. That is for the Court
to judge: whether 120,000 cubic
yards is an infinitesimally
small amount. That is not
a matter of expert testimony;
and I move to strike it out:
It being matter that the Court
can judge of as well as the
witness.

The Court. I will not strike
it out, I suppose it is re-
sponsive to the question.

Mr Hart. The point here is

Whether it is competent for
 the witness to say that 120000
 cubic yards here in this river
 would be infinitesimal

The Court. I think so

(Ex)

Mr Hart. We except

Mr. Deblee. What would be the
 depth of the deposit in the
 American & Sacramento River —

Mr. Cadwalader (Intg) Mr Smith
 did you say 600000, cubic yards
 or 100000. Cubic yards would
 be deposited down here

The Witness I said that in my
 judgment 600000, cubic yards
 would be excavated. That was
 my estimate, and that not more
 than 150000, cubic yards would
 come down into these rivers.

That is I assumed that not
 more than 120000 cubic yards
 would come down below River
 Bridge. I did not say that I
 assumed that ~~stated~~ that as a fact.

Mr Hart. That is 120000 cubic
 yards per annum
 A year, per annum
 Mr Rhodes You say that you

assumed that that much would remain in the river

A I said that 600,000 cubic yards would be excavated. I assume for the purpose of answering his question that not more than 120,000 cubic yards per annum would come down to these rivers.

Q That not more than 20% would find its way into the bed of the Sacramento and American rivers? A Yes sir, that is what I assume.

Q And the remaining portion of the 600,000 cubic yards would remain above? A Yes sir Mr. Dibble When speaking of the Gold Run mine what mine do you testify of?

A I mean those situated between the ~~edge~~^{ledge} of the pit that has been so frequently spoken of here, of the Gold Run mine and the line of the Central Pacific R. R. in its face of some 11,000 feet Mr. Dibble What would be

the depth of the deposit in the American and Sacramento Rivers and the Suisun and San Pablo Bays, supposing that $\frac{1}{20}$ of the material washed from the Gold Run mine was eventually distributed over their areas.

The witness You mean $\frac{1}{20}$ or $\frac{1}{5}$?

Mr. Dibble $\frac{1}{5}$. 20% as you states

A. The surface area of the water is nearly 200 square miles. 190,000 cubic yards deposited with an even depth over that area of 200 square miles. Because it is nearly that in extent — comes represent a thickness of about $\frac{1}{1600}$ part of a foot.

Mr. Cadevalader That's much?

A $\frac{1}{1600}$ part of a foot.

Q. Describe the deposits of sand and debris along in the mining and other rivers of the state? Especially the American river? and state how either material moves if it is moved

in the beds of the streams
 Mr. Cadwalader That should
 be confined to the American
 River. We don't want to
 explore all the other rivers
 of the state

Mr. Dibble No objection being
 made, answer the question
 Mr. Cadwalader I object.
 The question should be confined
 to the American river

The Comt. I overrule the objection

Mr. Cadwalader We except
 The witness Commencing with
 the Yuba river on the north
 and extending down to the
 American River on the south,
 there are large deposits of gravel
 and mining debris now remaining
 and now existing in the various
 streams and their tributaries.
 I estimate that the Yuba
 River and the Bear River and
 the American River — embracing
 those three streams and their
 branches — that they now
 contain probably from 300 to
 perhaps 350,000,000 cubic

(Ex.)

yards of material. That ma-
 terial largely consists of light
 gravel. A very large portion
 of it represents or is the re-
 sult of this washing of the
 surface gravel which I have
 described before. That material
 moves down. The lighter portion
 of that material moves down
 with each flood, more or less,
 gradually working its way
 toward the valley. The heavy
 material like that which I
 have spoken of, at the Polar
 Star dump, and also that
 which now comes from the
 Gold Run mine into the A-
 merican River, that or a very
 considerable portion of that
 finds a permanent lodgment
 near the bed of the river.
 By the term permanent lodg-
 ment I mean that practically,
 not absolutely. Because of
 course, if you give time enough,
 the river will wash its
 way down and bring all
 that; as it is the material

tendency of every mountain stream to erode its bed and get deeper and deeper. But we can say practically that this material is permanently lodged, while the light material which make the lower part of the grand total of 300,000,000, cubic yards is constantly moving during the winter floods. The movement of this material in these rivers is chiefly confined to the winter season or chiefly occurs during the winter season. The water picks up a small piece of gravel and carries it a little distance and then drops it. Another wave of water comes along and picks it up again and carries it a little distance and then it drops it. The generally tendency of all this material under the circumstances being, to move or be moved down the stream. That is true also of the sandy

Material which is carried in
 suspension in the water. Even
 in low water that is true.
 The great bulk which is in
 suspension in the water is
~~drawn~~^{threw} over and over and over
 again before it finally finds
 its way down to the valley.
 Some coloring matter - and a
 very small amount of earthy
 material will color water -
 May come down without being
 deposited on its way to the
 Sacramento river. But all
 sandy material is ^{dropped} drawn and
~~dragged~~^{dropped} over and over and
 over again a million times
 its way. One wave of water
 will pick up some particles
 of sand and then drop them
 again. And then another
 wave of water will after-
 wards pick them up again
 and so on. But the general
 tendency is of course, for
 all this material to work
 its way down into the valley,
 with the exception of that

heavy material which comes
from the lower bench of gravel,
the cements and heavy gravel.

Q Describe the general character-
istics of the drainage area
of the American River?

A The witness produced a
map, which is marked Smith
Exhibit # being a compilation
from the surveys in the office
of the ~~State Engineer~~ General. This
shows the general characteristics
of the American River drainage
Mr. Hart. Where did you get
that map? A This map

was made in the survey or Gen-
eral's office at San Francisco,
and certified to as correct
by the Chief draftsman

Q Who made that?

A It was made by Mr.
Cobide, or under his direction,
the chief draftsman of
that office

Mr. Cadwalader What kind of
a map do you call that?
Not a township map?

A It is a map showing

the general topography of the country and with the U. S. Section Surveys marked on it and also showing the location of the different Mining Surveys that have been made by the U. S. Government. There is a table attached to the plan showing the number of surveys which have been made. Mr. Dibble Will you point to the mine indicated as the Gold Run mine shown upon that map.

The Court. Answer the first question that was asked you please.

Mr. Dibble Describe the general characteristics of the ~~flow~~ drainage area of the American River? A The American now takes its source or source on the extreme summit of the Sierra Nevada Mountains. Mr. Hart. Do you state from knowledge or do you speak from the map. A. Oh, I have been up

Although there frequently my-
 self, but the map is better
 than my knowledge though.
 There are high peaks especially
 in the neighborhood of Pyr-
 amid Peak - Peaks that rise
 to the extent of 10000 or 11000
 feet and I don't know but
 some 12000 feet - the ~~nearest~~
^{most} two of the main peaks are
 not so high. Compared about
 8000 or 9000 feet high generally.
 The whole drainage area is
 as represented on the plan
 here, a good deal in the shape
 of a fan, and formed of pre-
 cipitous mountains and narrow
 canons. Finally all the water
 discharging from the mountains
 into a narrow pass or gap
 at Tolson, where the hills
 come close together and the
 river emerges into that canon
 from the mountains in a very
 confined space.

Mr. Wilson How wide is
 that narrow passage?

A Where the American River

Escapes from the Mountains just above Polam the Cañon is only 280 feet in width at extreme high water mark or 290 feet so that all the floods which are brought down by these various Mountains Cañons are confined as they escape at that particular point in a very narrow compass. I would like to say in regard to these Mining Locations, I think there are some 200 of them on the map there, Mining Surveys but they do not embrace by any means the entire number of mines in the drainage of the country. It only represents the mines which have been surveyed by the Mineral Surveyors.

Mr. Belcher How are these distinguished. How are those Mining Surveys distinguished on the plat?

A They are distinguished by numbers enclosed in little small red circles, and there is an index attached to the map

giving the names of the different surveys

Q. What is the acreage area of that water-shed?

A. The ~~entire~~ area of the water shed of the American river is 2100 square miles

Mr. Hart. Are you speaking from knowledge or from the map?

A. I am speaking from a calculation made from the map

Mr. Hart. I move to strike that out on hearsay.

The Court. So on

A. The mountain drainage area of the American River is less to be ~~confined~~^{defined} exactly but I should say it was between 1900 and 2000 square miles,

The mountain drainage area

Mr. Dibble Describe the causes of the floods which occasionally sweep down the American and other rivers of the State including the Sacramento?

A. The floods are generally caused by a heavy fall of snow in the month of November

and Early in December on the
 mountain sides. This snow
 will accumulate to a depth
 of 4 or 5 or 6 or 7 feet and it
 is very soft, it has not had
 time to pack as snow does
^{late}~~early~~ in the season on the sides
 of the Sierra Nevada; generally
 about Christmas or a little soon.
 In then that in flood years,
 warm rains fall, and continue
 to fall for some time. These
 rains fill up the lower rivers
 and it will fill them pretty
 full and this same rain is
 taken up by the snow on the
 mountain side, just as though
 the snow were sponge. I have
 seen it rain myself 8 or 10
 inches of warm rain in the
 twenty four hours, falling
 upon the snow and the snow
 absorbed nearly all of it,
 snow 4 or 5 or 6 feet deep and
 finally when the snow be-
 comes overburdened with water,
 when its sponge capacity
 ceased it is full of water

and it goes away and all
 comes down at once. In these
 cañons like that on the Amer-
 ican River or the Yuba River
 or the Feather above there are
 torrents, continuous torrents
 pouring down the whole length
 of those mountain sides. A
 person needs personal experience
 to see how rapidly water can
 get off the ground as it does
 there, it is perfectly marvelous,
 and in the mountain cañons the
 water, rise to a very great height and
 they come out in huge masses passing
 out together until they strike the wa-
 ters in the valleys which are already
 high, falling upon them and the result
 is a great flood in the valley. A great
 flood in Sacramento is only caused when
 all the rivers, the American, the Bear,
 the Feather and the Upper Sacramento
 are flooded and their floods unite
 at the same time, then the result
 is an enormous flood, all their water
 reaching Sacramento at about
 the same time



Mr Dibble State whether or not the maximum floods are determined or can be fixed by the amount of rain fall for the year

A the maximum amount of flood does not depend, or hardly at all upon the total amount of rain fall for the year because you can have a large flood like that of this present year 1881 without a very large amount of rain fall the flood would not continue so long but still the water in the river when it is at its maximum is much higher than it would have been with a rain fall ~~will~~ as great or 50 per cent greater.

Will the record of rain fall in Sacramento fairly show the general amount of precipitation in the Sacramento Valley?

A It does not ^{at} all; It certainly will not because there might be a very heavy rain fall at Sacramento and it may be light in the upper part of the Sacramento Valley. In the same year, I have noticed very great variation in the relative amount of rain fall even in Valley County and Sacramento City - a very great difference.

Q What amount of rain fall have you observed in the Sierra Nevada mountains?

A The largest amount which has come under my personal observation was, I think, about 110 inches - 105 or 110 inches in the year. The average rain fall at that particular point which is on the headwaters of the North Fork River is about

80 inches I think or 85.

Mr Goodvalade That embraces snow? A Yes, snow is always considered as rain-fall.

Mr Belcher Q What would be the rule as to precipitation comparing the Valley with the Mountain?

A You speak of the Sacramento Valley - do you speak of the Eastern side of the Sacramento Valley now?

Q The Eastern side?

A The precipitation as a general thing increases until you approach the summit being greatest within a few miles of the divide between California and Nevada.

Mr Noble Q What is the ratio? A The rainfall in different points of the valley varies very greatly much larger at Sacramento than it is 100 miles to

the South, or at the mouth
of the Sacramento River

Mr Hart Are you speaking
from your own knowledge
or from a table? A From
knowledge, always

Mr Noble Q What ratio
did you say? A Well it
varies from 5 to 15
times as much I should say

Q 5 to 15 times as much
where? A In the mountains.
It is a hard question to
answer because the rain
fall varies even in the
mountains. In one Valley
near the summit of the
Sierras ^{there} will be 50 per
cent more than in the
adjoining valley which
is only a couple of miles
from it and there are
great variations also in
the valleys

Mr Hart I suppose you
kept rain gauges in all
these localities? A I have
in quite a number of them.

I have had them kept.

Mr Dibble O What if any effect would be produced upon the Sacramento River if mining operations should cease within this drainage area? A I have spoken of the very large amount of this material, this light gravel and mining debris which is already in place in the Feather and Yuba and Bear Rivers

Mr Hart That is ^{a matter} where they seek to substitute the judgment of the Witness for the judgment of the Court we object to it as incompetent

The Court Make the question so that it may be specific as to the amount of water that would come down the stream and what proportion would be left in the bed of the stream

Mr Dibble If mining was stopped how much less

material would come down
the stream.

<Objected to as leading
and as assuming that less
material would come down>

A well I think that
practically no less material
would come down from the
rivers, certainly not for
quite a number of years
to come. There might be
less of the lighter material
which stains the water.
The water might become
clearer perhaps but the
total amount of material
carried even in suspension
I think would remain
about the same. The
amount, as I have stated
before, of old material
remaining up in the
mountains is very large
indeed now and that
is bound to come down

What are the mining
material? or the lighter
material remaining in

the beds of these mountain streams, is very large and that is as certain to come down as that water flows to the sea

The Court What do you call that material?

a I would call that material that which has come from the old surface washings of the mines

O what is it?

a It is sand and small gravel and with clay. Very often large quantities of clay, but chiefly sand, because a large part of what is known as pipe clay ^{consists} of very finely comminuted sand, you very often find very thick beds of pipe clay 15 or 20 feet thick, which is nothing in the world ~~but~~ very fine sand, the clay is, beds of so called clay are frequently nothing but beds of very fine sand

Mr Starr Do you include the American river in that answer? A Some of the clay beds on the American River are sand.

Mr Badwalader Where?

A In the mines there and in El Dorado County too

Mr Dibble Q Does material from other sources come down in addition to that which you have spoken of?

A There is what Mr Tall calls the natural wash besides from the mountain sides

Q What do you mean by natural wash? A He used it in the sense of all which was not mining wash

The Court That is the sense in which he used it A All of that material which was washed into the rivers which did not come directly or indirectly

from the mines. He used it in that sense.

Mrs Dibble What is that of?

A In the sense that Mrs Hall used it.

Mrs Hart As you are using it now.

A The question is a little mixed in the way that it has been asked. Will you repeat the question?

Mrs Dibble A What do you mean by the natural wash?

A I would confine my definition of natural wash to the washings of an unoccupied and uncultivated soil, by Nature alone without the soil being disturbed, that would be my definition of a natural wash, of the natural erosion which is going on in a country not disturbed at all by the action or work of man.

The Court Mrs Dibble asked you if there were other contributions besides those

that you have mentioned
Mr Dibble & where the soil
 has been disturbed by
 cultivation what do you
 call the wash? A. I will
 call that agricultural wash
 Q. What does that embrace?

A. Whenever the soil is
 disturbed by ploughing or
 cultivation, the rains
 during the Winter Season
 of course washed off that
 surface material with
 much greater readiness
 than if the soil had never
 been disturbed

Q. What is the effect of
 building of roads?

A. Every act of civilized
 man adds to the amount
 of material which is
 washed from the surface
 of the Country, increases
 that unavoidably. Those
 roads which you find in
 the mountains you very
 frequently see 4 or 5 feet
 deep below the surface of

the ground which is the result of the passing of wagons and grinding up the soil into dust which has blown away or washed away.

Q What is the effect of cutting off the timber?

A That adds necessarily to the amount of wash & erosion

Q How with reference to snow slides or lands slides? and frost?

A Of all the natural elements frost is the greatest in producing an erosion of the surface of a mountainous country. In tropical countries where I have been the wash is very slight indeed there, because it is not accelerated by the action of frost. Frost is the great disintegrator in the mountains. On the headwaters of the American I have seen places there and on the Yuba too

that the ledges of the country rock would be worn away at the rate of $\frac{1}{8}$ of an inch a year almost. which is a very prodigious rate. It shales off every year the surface of the ledges, due to the action of the frost. The snow slides scour out a good deal of material and there are a great number of snow slides occurring every Winter in the mountains and they are a very considerable source of washing, or added to the light material which is put into the river. Land slides I have seen a great many of in the mountains. Sometimes you will see them carried away from the banks of the stream several hundred yards. I have seen two land slides each of which would be certainly over 100000 yards

perhaps 200 000 yards and the material was washed down into the river beds; but as a whole I do not think they are productive of as much erosion as the snow slides in the mountains; but of all the three causes frost is certainly the greatest. It produces the largest results.

Q. Have you ever personally examined the proposed plans for relief in the American river and other rivers in the State, whose object is to restrain the flow of injurious debris, and so prevent it from injuring the Sacramento River and the Valley Lands?

A. I have examined with a great deal of attention and cause the several rivers for proposed dams whose object was to hold back the debris which

would otherwise flow
down into the Valley
both ~~from~~ ^{on} the Yuba
and American rivers

Q Give the Court a general
idea of what these plans
for relief are

< Objected to as immat-
erial and irrelevant;
the objection is sustained;
Ex ~~Defendant~~ excepts >

Mr Belcher With the
permission of the Court
we will take a little time
to prepare an offer be-
cause there are several
other questions which
we should naturally
ask following this, and
we will prepare an offer
with some care that
shall embrace not only
the question now pro-
posed but the other
questions immediately
dependent upon it and
will present it either
this afternoon or tomorrow

morning

The Court With the understanding that if necessary you can recall the witness for the purpose then of asking the questions contained in the offer if you think it is necessary for your exception

Mr Belcher Yes sir

Mr Dibble Q Describe, if you are familiar with it, the American River from Folsom to its mouth

A. < Witnesses produces Stalls Map. No. 27

Mr Leavelle What map is that? A This is a map prepared last year by Mr Stull the State Engineer and Col. Mendell

Q Is that the Manson map? A My Manson made some of the surveys

Mr Stull That is known as Stules Exhibit No. 2.

at the American River
 escapes from the mountains
 at Folsom and thence
 continues down to Alder
 Creek some 3 or 4 miles
 with pretty high banks
 on either side, and con-
 tinuing still lower down,
 the Northern side down
 to Farmer's Diggings and
 below that are quite high
 cliffs and with lower land
 on the left hand bank,
 the land gets generally
 flatter and flatter as
 the American River ap-
 proaches the Sacramento.
 This plan shows the
 general character and
 the elevation of the river
 bed very much more
 distinctly than any
 verbal explanation would
 give it. It contains data
 enough to enable a person
 to form a very good judg-
 ment of the American
 river below, between

Alder Creek and the
 Sacramento River, that
 is it would enable a
 person by inspecting it
 to form a very good judg-
 ment as to the character
 of the stream even if he
 had never seen it before
 The plan is very full
 indeed showing the ele-
 vation of the country at
 different points and their
 relative positions. The
 plan also shows high
 water marks at vari-
 ous points, the high
 water mark of 1861
 and the high water
 mark of 1880

Q Any thing further
 on that?

A No sir the map ex-
 plains itself

Q What is the carrying
 capacity of the American
 River from Folsom to

its mouth at present
 compared with what
 it was before the
 great flood of 1861
 and 1862?

Mr Start If you know
 A I think I know
 in regard to that
 and I can form an
 opinion which I
 can state: I think
 that the American
 River from Alder Creek—

Mr Start Were you in the
 State in 1862? A I was not
 I think that the American River
 in its present condition will
 carry more water now
 from a little distance below Al-
 der Creek down to where the
 velocity of the American River
 is stopped or checked by the
 back water from the Sacramento,
 than it did say prior to 1862

Mr Start O where is that point
 down to where? A Down
 below Brighton

2. Down to a point below Brighton?² A. Or near Brighton perhaps even lower than that. The river has evidently a very much larger channel than it had in old times, a very much broader channel. The old original bed is filled up but that space which it thus filled is very much more than replaced by the washing away of the present river from the adjoining sides. The river is very broad indeed now. In old times it was unquestionably much narrower and the plane itself shows, I think, that the high water marks of late years are very much less than the high water mark of 1861. I have seen myself the high water marks of 1861 along the banks; and the high water marks of 1881, ~~and the high water mark of 1884.~~ in the portion I have spoken of above Brighton was not nearly as high as 1861.²

5622

Mr Dibble. State the present

of the banks where you have examined them?

A The banks vary. In some places as I have stated they are high cliffs. Generally the banks get lower and lower as you approach the Sacramento River. At Wells' ranch which is some little distance I think above, not very far from Brighton - the present bank now is about 20 feet in height on the south side of the American River. At Rooney's ranch which is below Brighton it is less than that (referring) banks probably about 8 or 9 feet high I should say there, and at White and Manlove's ranch which is higher up the river than Rooney's the bank is 2 steps so that it is pretty hard to give it there

2 What has the effect been of changing the mouth of the American River by the creation of the new mouth?

A The effect has been in sending water right across

the river, when the American
pours out in floods, and cutting
away the bank on the other
side, and the filling up of the
old mouth of the American
River.

I wonder or wonder not such
have been the result if there
has never been any mining in
California? A I think
unquestionably so (Pencil Sketch).
This sketch will illustrate roughly
the changes that are taking place
by changing the mouth of the
American River; this will give
a pretty good illustration of a
common phenomenon attending
the changing of river beds. Here
the American river as it ran
before this change was made,
and coming in at an acute
angle comparatively with the
Sacramento river and in spite
of that it cut out quite a
Crescent opposite, on the other
side of the Sacramento river,
as is shown here as a very
high bank of the Sacramento

river had formed on the outer
 side of this crescent. Now
 the new mouth of the Amer-
 ican river was cut, a dam
 immediately was constructed
 to prevent the water from com-
 ing down the old mouth, and
 that has naturally filled up
 and it is filling up more at
 either end - it has filled up
 the most at either end. The
 American discharging its water
 through its new mouth, has
 cut out the bank on the other
 side of the river at Toyah
 Ranch I believe it is called,
 and it has scooped out quite
 a large slice from the original
 bank of the Sacramento on the
 west side, but it has also had
 the effect of filling up this
 crescent which I have before
 spoken of, which was formed
 by the old mouth, as the Amer-
 ican is building up for itself,
 and I suppose in time will
 build up for itself a pretty
 high bank, where this bank

on the East side of the Sacramento is, below its mouth.

Mr. Cadwalader Where do you locate that crescent created by the old mouth?

A. It is just opposite, just across here, it is shown by the old plans.

I across the river?

A. Yes sir, across the river.

I It dug that all out, did it?
A. It did dig it out I think. It is shown on the original plan of the Sacramento River. And this has just spoken of as forming below the new mouth of the American river if it were left undisturbed no doubt it would go on, accumulating and accumulating until it forms a real bank to the Sacramento river.

Mr. Dibble State whether or not the grade and current of the American river from its mouth at Sacramento to the point where it escapes into the Cañon from the mountains has been

increased? A. The grade has been ^{is} less now than it was formerly from the point where the American escapes from the mountains at or just below Folsom right at the narrow Canon there, because at the point where it escapes from the mountains, it is running on the original bed-rock, ^{and} the channel where it discharges in the Sacramento has unquestionably been elevated. The current is less than it was in old times because as I have stated before the channel is not as deep in the American between Folsom and Sacramento as it has been, but it is much wider and with a larger water area, and the current is therefore in my judgment considerably less in times of flood, than it was when the river was narrower and deeper.

2. What effect has the construction of levees on Sacramento river above or below Sacramento City had upon the

height of the floods since these levees were constructed?

A. The construction of levees along the banks of the stream which overflows its banks in times of general flood always has the effect, the world over, in elevating the level of the flood water, in the river proper.

2 Supposing the levees to be partly destroyed by flood, would or would not they have the effect of increasing the height of the water in the river proper?

A Even if partly or considerably damaged by floods, still the levees will have a considerable effect in increasing the high water mark in the river itself, because although they may not be complete dams still they form partial dams. As an illustration of the Sacramento river here, last year the water as it came down in the flood, first came up pretty high and then broke through

the levee, but these breaks were not sufficient to carry all the flood water by any means, although the breaks afforded partial relief to the river, still only a partial relief. It diminished the flood somewhat.

Mr. Cadwalader would it tend to increase the height?

A It does some I say, but does not entirely. The high water mark in the Sacramento river as I understand, of the last flood during February 1881, the river proper was about four feet higher than what it was in the tules opposite, between here and Davisville. If there had been no levees on the the river bank at all unquestionably the water would have spread over on ^a the level grade. If there had been no levees the river would have been nearly as high in the tules as in the Sacramento river proper, not quite

as high but nearly as high —
There certainly would not be
that difference

Mr Debbles State from your
Engineering Knowledge what ef-
fect in other rivers in the
world the Erection of levees
has had in increasing the
height of floods?

A Well, in every river, that
has ever been leveed the height
of the floods in the river
itself is very much increased
by the Erection of levees. On
the Mississippi River for
instance, Humphreys and Abbott
determined in 1852 or 1853
that if a perfect system of
levees was constructed protecting
the entire Mississippi Valley
that the height of the high
water mark in the river its-
self would be increased at Lake
Providence about 11 feet, and
when they made that estimate
which I have no doubt is
practically correct, the Mis-
sissippi River had been very

largely protected already by levees, and at the time they made this examination the high water mark in the Mississippi River was much higher than it had been before that time, owing to levees which had been constructed in part in times past. There is no question I think, as to the fact that the erection of levees increases the flood height very greatly. It depends largely on the river, how much extra water the river must hold. In the Sacramento River it would require enormous levees to carry all the water which the river makes in times of great flood. I have a section illustrating that in regard to the Sacramento River

Mr Belcher have you it
in your hand?

A Mr Codwallader has it
Mr Siboe We desire to pre-
sent that as an exhibit.

(To witness) by whom was
that made.

A. This plan was made
under my direction by
the engineers of the C.P.R.
R.Co. Mr Wilkinson - it
was made personally under
his direction. This represents
a cross section from the
Sacramento River to Swangles

Mr Belcher Does that exhibit
have any mark. Suppose
we mark the plat that
was introduced before this
exhibit A (The map of the
American River and its
tributaries was marked ex-
hibit No. 5 And the section
from Sacramento to Swangles
was marked Number six)
Mr Codwallader What does
this map show?

A This is a profile on

The line of the C. P. R R
between Sacramento City
and Swingles in Yolo County
Q That is the same Swingle
who testified here the other
day ?

A. I did not hear him
testify, This section illus-
trates very clearly the
great difference between the
water ~~area~~^{area} in times of flood
in the Sacramento River
and in the low lands
which bound it. The
section of the River in
flood is about 21000
square feet, something like
that but will not vary much
from that.

Mr Camallader That is the
section of the River }

A Yes the area. the area
and square feet, it is a
section of 21000 square
feet

Q That is the River }

A Yes. The River itself,
between Swingles Station

And the Sacramento River
up to the line of the
O. P. R. R. the Rail line
there is an area of four
hundred and seventeen thou-
sand seven hundred and
forty eight square feet,
Mr Hart That is if you
run it up high enough
A. The water in the last
flood of 1881 was generally
a foot or a little more
than a foot above the
line of the track, above
the line of the Rail Road
track, above the top of the
rail.

Q How high did you
run that to make that
area?

Mr A The area is Calcul-
ated up to the top of the
rail, Now adding that
extra foot and you will
find out what the sectional
Area of the body of
water last year was.
You would have about

460 000 feet square of
 sectional area of the water
 on the other side of the
 Sacramento River extending
 to Swingles or compared
 with 21000 feet in the
 river itself, being about
 twenty times as much or
 more than 20 times as much
 as the area of the Sacramento
 River, now Comparing the
 actual water way, because
 a portion of the Central
 Pacific line between these
 two points is embankment
 now Comparing the openings
 which they have - they
 have ^{520 000} ~~300 000~~ square feet
 of openings between the
 Sacramento River and
 Swingles. The water run
 a foot deep as I have
 stated before above the
 track which would add
 to the 40000 square feet
 so that there was a mov-
 ing body of water repr-
 esenting a sectional area

of 160 000 square feet as compared with 21 000 square feet in the river proper, that is there was about eight times as much water moving down in the tules than in the Sacramento River proper and doubtless very much more water passes down the tules in time of flood than passes in the Sacramento River

Mr. Caldwell You take the top of the plain - would be the railroad track?

A The water went a foot above the track

Q You are referring to the tule between Swingle's and Sacramento? A Yes.

Q Extending from Swingle's to Washington rather? A Yes.

Q That you call the area of the discharge? A The area of discharge was about 160 000 square feet

as shown by this section
The area of the actual discharge was about 16000 square feet

Q As contra-distinguished from the whole area?

A As compared with the whole area. Of course before Sacramento City was protected by levees say prior to 1862 and I believe that is the time these large levees were built here a large part of the flood waters of the Sacramento River and of the American river came down over the pite of Sacramento, so that the difference was still greater before the Sacramento levees were built than it is now. I suppose that in times of floods —

Mr. Hart (intg) I object to Mr. Smith stating what he supposes.

The Witness I should say

roughly that at the time of the flood last year the Sacramento River proper probably did not carry —

Mr. Start (out) Were you here? And sir I was not

Mr. Start I do not think the witness can form an intelligent basis, not having been here. He does not know whether the river was bank full or whether it was at the low water mark.

The Court I suppose he may base it on certain data. He may assume the data presented by your witness.

The Witness It is impossible for an engineer or any man to estimate closely as to the relative amount of water passing last year down the Sacramento River and through the dikes. Roughly I should say —

Mr Sturtevant <intj> We have objected to that question <To Witness> An engineer could make a better guess as to the amount of water running through a channel without seeing it than anybody else can?

A I think he can

Q He can make a better guess? A Yes. Because he knows how to guess. And another man who is not an engineer does not know how to guess

Q Do they carry that system of guessing into the Engineering Schools?

A I believe that your engineers have guessed a good deal and it seems to be a favorite method. Any engineer in discussing a question in a large way is compelled to guess very considerably

Mr Belcher We object to this cross examination at

this time. We say that their own witnesses have told us how wide that tule basin is between here and the high land on the other side and how deep the water was. and any Engineer can form some reasonable estimate of the amount of water carried by the tule and by the river.

Mr. Hart At any particular time?

Mr. Belcher Yes. It may be high water and it may be low water. It can testify by what it would carry.

The Court What are the data upon which you found your opinion?

A The most reliable data is the section which I have before me and that is the only data worth anything to enable an engineer to make an approximation as to the particulars

amount of water

Q How do you get the height of water? A I have them on this. This plan was made as I stated by Mr Wilkinson of the Central Pacific Rail Road Company.

Mr Belcher who was placed on the stand on the part of the plaintiff

The Court I do not know that he testified as to the height of the water

Mr Belcher My recollection is that he testified as to the depth of the water

Mr Hart He was not examined on that question He was examined in relation to soundings which he made in the river in 1879

The Witness Can I answer the question this way? Suppose this section is correct?

Mr Badwalades The object

Mr Belcher The Witness

can explain upon what date he has made his statements. We will bring Mr. Wilkinson to prove the correctness of this cross section and if he is not brought to establish its correctness this testimony so far as it is based upon it will be stricken out.

Mr. Stark This is incompetent evidence. She cannot judge of the amount of water that ran through this river last season, not having been here. The Witness He said that he could make the section accurately I think.

The Court I will allow this testimony on condition that the connecting testimony will be supplied hereafter.

A I think that during the flood of last year and when the flood was at its greatest height probably not more than

one third of the water which was passing opposite Sacramento was confined within the banks of the river itself. I am enabled to make a guess, a rough guess that way because at times during other floods I have seen the velocity of the current passing down through the openings in the railroad opposite Sacramento. I crossed there I think in 1878 after the railroad was broken.

Mr. Start You now have stated your guess.

A I am stating the reason why I guessed it. During 1878 I passed across the low land opposite here and was enabled to judge about what the current would be and I could form some general opinion as to what the current was at times of considerable flood in the tule lands

Of course in estimating the flow of water, you have to know two facts: you have to know the sectional area which the water fills, and then the mean velocity of the water. After having these you can compute the discharge. This section shows the sectional area and the velocity is a matter of guess work. I think it is perfectly clear from what I have said that it would be necessary to have levees of enormous height.

Mr. Root I object to this witness testifying in an argumentative way. I insist that from this time on Counsel shall manage the Case and that they shall ask this witness questions that we may have an opportunity to object and that his answers

Shall be statements of fact
and not argument.

The Court Omit the argum-
entative form of your state-
ments.

The Witness I think therefore
that if all the water during
flood times were confined
within the Sacramento river
proper it would require
levees of an enormous height
to confine the water to the
River proper.

Mr Dibble you have spoken
of the Mississippi and
the increase of the height
of water in the River

caused by levees constructed
on its banks. Will you ex-
plain to the Court the
natural condition of the
lands along the lower
Mississippi which have
been thus affected by
these levees.

Mr Hart I doubt whether
they can go into specific
instances for the purpose

of establishing a theory.
 Mr Belcher The object of the
 testimony is simply this;
 to show that the Mississippi
 originally through the state
 of Louisiana was relieved
 by bayous which put out
 from the River into the
 low lands and that the
 River there operated in
 the same way as does
 the Sacramento from this
 City down to its mouth
 and that the two Rivers
 are alike in situation
 with the difference that
 there is a long River
 and Louisiana is a long
 way from the mountain
 sources of the stream while
 here the mountains press
 close upon the valley.
 Mr Cadwallader In that
 case the knowledge of the
 witness must be derived
 from personal observation
 or if from books the books
 must be proven —

Mr Hart The objection is that it is not based on his own observation. We say that if they undertake to establish that the Mississippi River is in a certain condition it must be proven by a witness who knows the facts personally and not from knowledge derived from books. The Court I will permit this evidence.

& Mr Hart excepted.

(The Reporter Read the question)
A River that run through all alluvial Countries no matter whether they are large or small, from the smallest Creek up to the largest River form their beds and their banks according to the same law. Their banks are always higher than the Country immediately behind and they gradually deposit material in the bed thus lifting the bed and deposit

Material on these banks at the same time so that the Rivers are in a continuous state of change, both their beds and their banks rising. The Mississippi River resembles to that extent - having been formed by the same general laws - the Sacramento Valley but the Mississippi River carries a much larger proportion of its water within its banks than the Sacramento does, than the lower Sacramento does.

Mr Belcher I do not think you have fully answered the question yet, as to what was the natural topography of the Country before the building of levees. How did the Mississippi relieve itself of the surplus water in the lower River? A The Mississippi River in flood time discharged a very considerable portion

of its waters into the low lands which are similar to the tule lands here. The waters were discharged through bayous and creeks. Mr Dibble does it do the same thing since the construction of levees?

A The levees are broken as I believe at the present time, a great many of them.

Mr Hart Where is that?

A On the Mississippi. I will tell you for your information, General, that I have been upon the Mississippi a great many times I do not know how many times, and that I am very familiar with it.

Mr Dibble Does or does not the protection from floods by levees of one piece of land render it more difficult to protect adjacent tracts from floods?

A I think that is self evident. The erection of levees makes it more difficult to protect adjoining lands from floods.

Mr Belcher You mean both lands above and below?

A Either lands above or lands below. I would like to submit this plan which is a copy of a plan in the State Engineers Office to illustrate better what I have said some time ago in regard to the passage of water down the Sacramento Valley or opposite Sacramento
Mr Belcher We offer it as a diagram

(It was marked exhibit seven)

A It is a diagram representing the valley of the Sacramento from Nicolaus down to below the Junction of the Sacramento with the San Joaquin.

The Court Let the exhibit
be marked.

Mr Cadwallader Is that
map from a survey made
by the State Engineer?

A Yes.

Q After he investigated
the fill of the River?

A I think it is his last
work.

Mr Cadwallader I just wanted
to know whether it was a
map that he made of
his survey of the River?
The Witness. That map fully
shows the whole lower
Valley of the Sacramento
and such a map is neces-
sary in order to arrive
at any correct idea of
the Character of the lower
River.

Mr Dibble What is the
effect of the erection of
levees and dykes upon
the banks of a River
upon the bottom of the
Stream?

The Court Upon the Volume
flowing in the Channel
Mr Belcher No Sir. The
effect on the bottom of
the Stream?

A. In some Rivers it has
unquestionably had the effect,
- the erection of levees on
the sides - of making the
Rivers build there beds
up. There are several Rivers
well known to Engineers in
the world where the bottom
of the Rivers is very con-
siderably higher than the
adjoining lands. The
Adige and Brenta Rivers
and I think the Reno are
familiar instances to Engineers
where the River bed is
considerably higher than
the adjoining lands; in
the Adige the River bed
is eleven feet or I believe
twelve feet perhaps, at
the time of the last survey
of which I have seen a
5652 Map; higher than the

Adjoining Country

Mr Hart Are you testifying to that as a fact

A. I am testifying to what I understood from Engineers to be true.

Mr Hart I do not think this witness has a right to testify as to the actual condition of these Rivers. The Court I suppose that is a part of an Engineers learning on which he bases his opinion.

The Witness In other Rivers It is thought that the erection of levees has had the effect of assisting the scouring action of the stream. In regard to the Sacramento River I believe that if it were thoroughly protected by levees, that is if all the waters at extreme floods were kept within its banks and the channel was made of regular size -

I believe that the Sacramento
 River could be made to
 scour down perhaps to
 its original depth and
 perhaps deeper but in the
 present incomplete state
 of the levees I do not know
 but they do more good
 than harm (afterwards
 connected to read "more harm
 than good") I have noticed
 in times of flood in the
 Sacramento that the River
 will come down with a
 great current and a great
 boom when the freshets
 first commence, and the
 water coming down with
 a great deal of velocity
 unquestionably picks up and
 brings down into the
 lower Sacramento a large
 amount of the material
 which has been lodged
 higher up. After the River
 has come up outside of
 its banks it has always
 as far as I knew it and

And I believe it has been
 the Case every year always
 in times of flood, it breaks
 the banks of these levees
 lower down and the water
 runs from the River bed
 through those breaks
 and thus checks the
 Current very much in
 the River proper: In
 Steamboat slough for
 instance, I have been down
 there two different times
 when the water was running
 up stream and that was
 due to the great escape
 of water through those
 broken levees. So that in
 the whole I think that
 the imperfect levees
 which have been built on
 the lower Sacramento
 have added to the overflow
 and to the amount of
 filling. It is of course a
 mere matter of opinion
 but I think the chances
 are that these levees

Have had that result

Recess Until
2 P.m.

In the Superior Court
of the State of California
in and for the County of
Sacramento

The People of the State of California	} Afternoon Session Wednesday Dec 14 th 1881
vs. The Gold Run Ditch and Mining Company	

Transcript of Testimony
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Hamilton Smith, direct resumed
Hamelin Smith Cross ex

Winfield J. Davis
Official Reporter

Wednesday Afternoon Dec. 14th 1881

Direct examination

Hamilton Smith, Continued:

The witness - Your Honor: - I have been told, that I made a mistake, in my testimony this morning. The Reporter has called my attention, to a mistake, in the language of one of my sentences. Can I correct that?

The Court: - Yes.

The Witness: - I intended to say, that the levees, along the Sacramento River, in their present incomplete, and broken ~~down~~ condition, probably did more harm, than good, so far as the scouring action, of the river, was concerned, upon its bottom. I thought I said that. The Reporter tells me I did not.

Mr Cadwalader: - This is your corrected

statement

A - Yes sir.

Mr Dibble:- What is your opinion as to whether the American, and Sacramento Rivers, always occupied their present channels?

A - They ~~have~~, unquestionably, ~~have~~ varied their channels, working about, from place to place.

Q - State if you know, what changes, of light character, have occurred in their Rivers?

A - I have seen that myself, especially, on the Mississippi River. And on the Missouri River. Those two Rivers, have changed their beds very frequently. The Mississippi River has made quite a number of cutoffs, in late times. And other Rivers, of which I have knowledge. Engineering works are full of such changes. The Gauges, and all the great Rivers, running through alluvial countries, change their beds constantly, and very much. As to Rivers in Europe,

where I have examined their banks, their ~~land~~ banks are protected, where the land is valuable. As I have seen myself. The lower portion of the Rhine, as I have seen, is protected by brush work. Higher up, they have stone work or stone embankments. That is to say, their banks are protected, by framing in stone, extending for many miles. I have observed the same thing, in regard to the French Rivers where protection is necessary. They are protected against erosion, or changes of their banks, which would otherwise occur.

Q - Has it been necessary to protect, by engineering devices, the banks of rivers, and to prevent their erosion?

A - I have already stated that.

Mr Hart: - He has already stated that; but we think, this testimony is objectionable. The Court: It seems to me, that certainly, this is of hardly sufficient

importance in this case, to dwell upon it.

Mr Dibble: - State if you can, what amount of sediment, the Sacramento and American Rivers, transported;

Mr Cadwallader: - Do you mean in suspension Mr Dibble?

Mr Dibble: - State if you can, what amount of sediment, the Sacramento and American Rivers transported?

The Witness: - I will in a moment.

Mr Hart: - What is that you are going to read from?

The Witness: - I was looking at Mr Hall's figures.

Mr Hart: I don't know as this witness has a right, to look at anybody else's figures, in order to state a fact as of his own knowledge.

Mr Dibble: - That is what, we are trying to ascertain, his knowledge in reference to this matter.

Mr Hart: - No Sir. He is not

going to give that. Now we say, that his knowledge, cannot come from any body else.

Mr Dibble:- If you have any objections, you can address it to the Court.

Mr Heart:- I am addressing myself to the Court

Mr Dibble:- Answer the question

Mr Heart:- I don't think, the witness, has a right to look at other people's figures, in order to determine the fact, with respect to a matter; as to which, he proposed to testify. He can find, and examine other people's figures, without his reading them. It don't make it any stronger, if somebody else, swears to them.

The Court:- The witness can state, what has been, within his own observation, and he can give the data of any estimate which he ~~wishes~~ makes.

Mr Dibble:- State the results

of your examination, and the data from which, you give your testimony

A- The data, the only data valuable, in regard to this matter, ~~are those~~, which have been accumulated, by Mr Hall, the Engineer.

Mr Wilson:- Have you any objection to that? We want Mr Hall's statement.

Mr Hart:- We have got that. We do not want, Mr Smith's construction of it. We are capable, of construing that, ourselves. If Mr Smith is capable, of testifying to this matter; he must have made some estimate, in regard to it himself; he must have figures known to him, in ^{the} same way, that they were known to Mr Hall.

Mr Dibble:- Read the question "The Reporter:- State the result of your observation, and the data, upon which your testimony?"

Mr Hart:- Got that one.

"The Reporter: State if you can, the amount of sediment, that the American and Sacramento rivers, transport?"

A- The data, and only data valuable in that matter, ~~are~~ ~~those~~ which have been accumulated by Mr Heall, the state engineer."

Mr Heart:- Well, we object to that,

The Court:- You can call his attention, Mr Dibble, to the figures, given by Mr Heall, if you wish to ask him, about that. If you have the figures, of Mr Hall's; which were given in his testimony, you can examine this witness, about them.

A - My estimates are based upon Mr Heall's figures, but are expressed in a different way.

Mr Belcher:- Mr Heall's figures, are those stated in his report; are they?

Mr Heart:- We don't want this witnesses construction of Mr Hall's

figures. It seems to me, that when an expert, and particularly, when such an expert, as Mr Smith, is put on the stand, to testify as to a fact, or a calculation, which it is to be presumed, is peculiarly within his own knowledge, he ought to make it evident that such a matter, is peculiarly within his own knowledge, and I insist, that he ought, not to be permitted to come here; as an expert, and then testify, as to figures, made by somebody else.

The Court;— It is not uncommon for an expert, to go on and explain, or controvert, the imperfect or erroneous calculations of another expert.

Mr Hart;— Unquestionably, that is so; but here, he shows an absence of knowledge.

The Court;— He may go on to show the fallacy of

another experts, figures or calculations. It is not at all, uncommon, for a witness to do that.

Mr Hart:- That is true your Honor; but here this witness, shows an absence of knowledge, only. He ~~says~~ ^{says} ~~states~~ he has ~~no~~ knowledge, except these figures, which come from some body else.

The Court:- It is not uncommon even where the expert, that is called, on an opposite side, has no knowledge ~~in~~ with respect to the matter, except what the other expert, has given.

Mr Hart:- But here, it would be a mere matter, of mathematical calculation. I do not think, an experts testimony, is needed on such a subject. I do not think, there is any requirement of that kind among intelligent people at this time.

The Court:- I do not see any thing, improper in the examination

at all.

Mr Wilson:- We expect to put Mr Heall, on the stand to prove the data.

The Court:- Mr Heall will be made your witness; to prove the figures, I understand? The figures, which are to be used here?

Mr Wilson:- Yes sir.

The Court:- Made by Mr Heall from observations made by him?

Mr Wilson:- Yes sir.

The Court:- Go on.

Mr Hart: He object, to their assuming any figures, and take ~~their~~ our exception.

The Witness:- Based on the figures; which are taken from Mr Heall's report, and I find that the American River, at low water mark, carries 935 parts, by weight, to one of sediment. That is, the water is nine hundred, and thirty five parts to the sediment one. That

is the mean of three observations.
 Mr Cadwalader:- Is that according to the report, or testimony of Mr Heall?

A- It is according to the report, sir. The American at high water, carried one hundred and ninety parts of water, to one part of sediment. That was the result of one observation.

Mr Heall:- What was the first one?

A- Nine hundred and thirty five parts of water to one of sediment. The maximum amount of sediment contained in the American, according to Mr Heall's estimates, or observations, is sixty five, of weight of water, to one of sediment. No. I think I have given that wrong. It was a mean, of one hundred and ninety parts of water to one. That was the mean of five observations. The maximum of sixty five to one, was the result of one observation.

That was the one, that was the result, of one observation. The Sacramento at medium flood, at I street, contain twelve hundred and twelve parts of water, to one of sediment.

Mr Hart:- That is your calculation.

The Witness:- ~~Those are~~ Mr Hall's figures.

Mr Dibble:- Let the witness answer. You can cross-examine him, when it comes your turn. This is a new method, of cross-~~examination~~. examining the witness, while he is being examined on his direct examination;

The Witness:- I use Mr Hall's figures; but put them in a different shape, He puts them in a different way. He makes his computation, in a different way. I am transposing it. The Sacramento River at Freeport, contains eight hundred and fifty two parts of water, to one of sediment. That was the mean of eight

observations. These proportions are determined by weight; which is the general way of engineers, in determining, the amount of sediment in the streams.

Mr Dibble:- How do these rivers compare on that basis, of calculation with other rivers; as to the amount of sediment transported? On the basis of that calculation, how do these rivers compare with other rivers, in the amount of sediment transported.

A- There are very many other rivers, that carry much more sediment, than the Sacramento. And some rivers, that carry considerable more than the American. I have prepared a table here, which illustrates that statement. I can read it if you like?

Q- Go on

A- It is rather long.

Mr Cadwalader:- Is that taken from any published works.

A- From various authors.

From a large number of Authors.

Mr. Hart:- The object to the witness stating from Authors; as to the fact or amount of sediment, carried in the river. ~~It~~ Upon the ground, that it is incompetent, and upon the ground, that the only one in which, the fact of the amount of sediment carried, can be proven is by actual knowledge.

The Court:- I don't know that it is necessary to prove this matter in this way. I suppose we all have access, to those books. He says gentlemen, that other rivers, carry the same or other sediment, I suppose that, that is nothing?

Mr. Belcher:- Then if he has prepared a table, which is a peculiar and convenient form - more convenient, than could be otherwise, had, - it may be offered in evidence? The correctness of that, the gentlemen can ascertain on cross-examination, if they think there is any error in it.

Mr Cadwalader:- There are so many varying circumstances, that controll -

The Court:-(interrupting) I don't know as I care about hearing anything more in regard to this matter. I think I will stop the examination upon that point, upon that subject,

Mr Belcher:- Have you got that paper Mr Smith?

A- Yes ^{is} (handing paper)

Mr Belcher:- I understand that the Court excludes the question.

The Court:- I exclude anything except the general question.

Mr Belcher:- That excludes this table.

The Court:- Yes sir.

Mr Belcher:- Now we offer to prove by the witness - and we expect that we would prove if he were allowed to testify - as to the amount of sediment carried by

River Po, the river Danube,
 in flood or at its average.
 The river Garonne. The
 river Rhone. The river
 Nile. The river Vistula. The
 river Rhine. The Ganges; both
 above and below its junction
 with a brahmah contre Ho Ho.
 The Mississippi at different
 points, as at Carrollton and
 at Memphis, and at its
 mouth. The Indus.
 With the Author's names
 given, from whom
 the statements are
 taken. As to the river
 Po, it is upon the
 authority of the well
 known ~~Bardino~~ Lam-
 bardino, an author ac-
 cepted through-out
 the world as one of
 the most careful
 observers. I do not
 know that I need
 to give a list of these
 Authors. Because I
 may, instead of troubling

the Reporter, to take all this down, I may make a fuller offer in writing, which will shorten the statement here very much. And we will then give fractions. The witness has already given fractions as to the American and Sacramento Rivers. I will give some with respect ~~to~~ to these other rivers. If ~~the~~ Court allows me so to do.

Mr Dibble:— I understand that this paper is objected to, as well as the question?

The Court: It is excluded. Have you any further questions?

Mr Dibble: How should the amount of sediment in a river be determined?

A— It can only be determined by a careful examination of the stream

by an engineer. And it can only be determined with accuracy by a large number of experiments repeated during every day in the year.

Q- Every day?

A- Yes sir:

Q- What is the proper way for an engineer to estimate the amount of damage caused by the filling in of the Sacramento river?

A- In my opinion, the measure of damages is to be ascertained only by measurements at the low water mark. That is the ~~about~~ the only way you can get at the damage ~~caused~~ by the filling in; finding the conditions of the stream at low water mark. Measuring the stream at low water. That will give an estimate or

a basis more accurately than can be obtained in any other way, except by a careful and thorough survey of the river, of its dimensions and carrying capacity.

The Court: What do you mean by its carrying capacity?

A - I should say that if a river was diminished in size. The damage would be ascertained in this way.

The Court: - Damaged how?

A - By diminishing its carrying capacity. Or in other words, the diminishment of its carrying capacity would be better determined by the increase of the height at low water mark than in any other method, that is by determining the increase of the height,

if any at low water mark examination. That is, in the absence of an accurate survey of the river.

Mr Belcher:— If the Court will allow me to ask the question,

Mr Hart:— I will be more liberal than you are not make any objection.

The Court:— I think I made the objection to the other side.

Mr Hart:— No sir, the objection was made first by Mr Belcher.

Mr Belcher:— I desire to know whether a stream running through alluvial with no levee on its banks; whether as its bed fills up, its banks will rise?

A— That is the natural tendency with rivers— for the banks to rise with the bed. That is

the natural tendency with rivers, that run through alluvial soil; for the banks to rise in the same proportion as the beds.

Mr Dibble:- Assuming that the low water mark of 1881 is six and one half feet higher than that of 1849, in your judgment as an Engineer, what effect has this filling had in increasing ~~the~~ height of the flood at Sacramento?

A- I think it can have had but a slight effect in increasing the high water mark. The extent or expanse over which the high water spreads itself is so very great, after the river gets outside of its banks or over or behind the levees - is so much greater than the section occupied by these fillings - that

these fillings can have but slight effect in increasing the high water mark. If the river were confined within its banks by levees, it would have a far greater effect, as a matter of course, than at present. Because this river in its time of flood or these rivers in their floods, in their floods, spread themselves over this great extent of country nine miles wide.

Mr Hart:- I want to see if whether that question is in relation to the river itself or to the basin, The Reporter read.

Mr Dibble:- Can this raising of the low water mark be attributed to any other cause than the filling of the river?

A- There is another cause to which you can attribute it beside the filling

of the river.

Q- State it?

A- It is the amount of water which is discharged from the mining reservoirs during the low water seasons and which is therefore added to the amount of water the river would otherwise carry in low water.

Q- State what reservoirs for the storage of water have been constructed by miners in Sacramento, river drainage? And also state if you know, their storage capacity?

A- The Bloomfield Co, the reservoirs of the Bloomfield Company, have a capacity of one thousand and fifty millions cubic feet. The Milton Company reservoirs have a capacity of six hundred and fifty millions cubic feet. The Eureka Lake Company

reservoirs have a capacity of eleven hundred and thirty millions cubic feet. The Foreayde^{+other} reservoir of the South Yuba Company contain about ~~one hundred~~ eighteen hundred million cubic feet. The Omega and Blue Tent Companies - their united reservoirs - have a storage capacity of about three hundred millions cubic feet. The Spring Valley reservoirs have a capacity of three hundred million feet. The California water company's reservoirs have a capacity of nearly six hundred million cubic feet. I know of these from my own knowledge, with the exception of the two last named. The Eldorado Company's reservoirs have a capacity of one thousand and seventy million

cubic feet. There are also a great number of small reservoirs on the Feather and the Yuba and the Bear Rivers whose united capacity, I have estimated at seven hundred million cubic feet. Making a total of seven thousand six hundred million cubic feet of storage capacity for water. I am pretty familiar with all these reservoirs except those ~~the~~ belonging to the California water company and the Eldorado company.

Mr Dibble:- When is the water drawn from these reservoirs?

A- It is generally drawn from the middle of July, for the period of the next four months. It is drawn during the dry season.

Q- What would be the volume of all their waters at Sacramento? Suppose this

water to be exhausted, by draining it at a regular rate?

Mr Hart:- I object to their making hypothetical questions? or hypothetical cases for their questions.

Mr Dibble:- Here the witness has a knowledge based on fact.

Mr Hart:- They are constantly making hypothetical cases and putting questions upon them.

The Court:- I do not see any objection to their making a supposition of this kind, they may suppose that the water is to be discharged within two or three or four or five or six months, I don't see any objection to that.

Mr Hart:- He might say that it is evident that a discharge of that amount of water in one

day would mandate the
~~an~~ intire valley. But that
 testimony would be of
 no value here, and
 the supposition itself ~~is~~
 would be incompetent

The Court: - The value of
 the testimony depends
 upon how reasonable
 the supposition is. I give
 you the benefit of an
 exception. Go on.

Ex. Mr Hart: We take our
 exception.

The Witness: - If this water
 be drawn off regularly for a
 period ~~for~~ of four months
 it will make a flow of
 seven hundred and
 twenty cubic feet per
 second. Seven hundred
 and twenty cubic feet per
 second. In a river five
 hundred feet wide
 with a current of one
 and one half feet per second
 it would increase the depth
 twenty five and one ^{and} hundredths

^{of a}
 per foot. I know of my own knowledge that as to the reservoirs of which I have spoken the water is drawn off during this period of four months. And as a general thing it is regularly drawn; the miners depending on this supply of storage water for their water for use from the middle of July, generally, until the middle of November.

Q- What effect do these reservoirs have in restraining the floods here?

A- I think they have a perceptible effect. As an illustration, I may say that the mining reservoirs on the Guba will hold an aggregate amount of water equal to the discharge at the extreme flood of the Guba river for twenty four hours. That is, equal to the discharge

of the Guba river for twenty four hours, at its extreme flood. Which is a large amount, as you can well understand; It would require that the Guba river should pour out of its mouth at full flood for twenty four hours in order to fill these reservoirs. And the Guba never remains - at least I have never seen it remain - at full flood for twenty four hours.

2- Of what other use are reservoirs? To what other use may they be put?

A- It has been frequently proposed by engineers to restrain the floods by them, by the erection of reservoirs. That has been done in some cases, I believe

2- It has been shown that the character of the boats navigating the Sacramento river has been

changed from comparatively deep draft vessels to light ones? State whether such a change has been made, if you know, on other rivers with which you are familiar?

Mr Hart:- The object to that.

The Court:- This witness has no professional capacity, I suppose, from which to testify on that subject.

Mr Belcher:- This is something, which he himself has observed. There is no necessity of any professional knowledge on his part in that respect. But we don't press the question.

The question was withdrawn.

Mr Dibble:- It has been stated, that the water from Sacramento City has been occasionally pumped out.

Are you familiar with other places, where it has been removed in the same way
 A - I am.

Q - Name them

A - The city of London. The whole drainage of the city of London is pumped out. The lowlands in Holland are kept free of water by being pumped out, as well as a good many of the cities there. And very many other cases besides could be noticed.

Mr Hart:- Did this come under your actual knowledge?

A - I know that it is so in London and in portions of Holland.

Q - You have been there

A - Yes sir.

Mr Dibble:- Do you know whether or not, there has been any filling in San Francisco or San Pablo Bay since 1848.

A- I do, ~~not~~

Q- What was the depth, the known depth of the water in San Pablo Bay off Pinola, Point Pinola within your knowledge

Mr. Hunt: The object. If that goes back to 1848, it is already in evidence that this witness was not here in 1848.

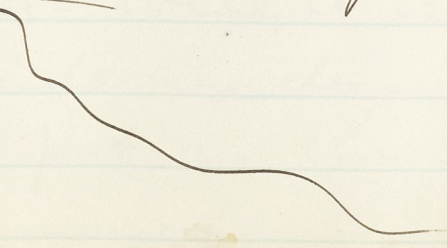
The Court: I understand that he is to speak from his own knowledge?

A- I have compared the two charts of the Coast survey in regard to this matter. One is from the survey made in 1846, and the other was made last year, I think - in 1880. And my knowledge of the San Pablo Bay

is derived almost entirely from a comparison of these two charts. That is the only way of ascertaining what the filling really is in my judgement.

Mr Dibble: Explain the charts and who made them? When were they made and who made them.

A - I have before me the chart which was published by the Coast survey, for which it appears that the Hydro Hydrography was taken in 1856. The soundings given on the chart were made during that year. And I can point out if you like the depth of water which ~~not~~ existed off Point Pinola, in the main channel at that time, as shown by this chart



Dibble

Mr. ~~Dibble~~ State the amount?

Mr. Cadwalader - Is that a copy of the chart which you have got there?

A. Yes sir

Mr. Hart - Then that is the best evidence.

Mr. Cadwalader - That is a copy.

A. It is the official chart.

Mr. Cadwalader - It is the chart itself?

A. Exactly, certainly.

2 - Any one who wishes can examine as to those matters for himself on the chart?

A. Any one who knows how can examine the chart

Mr. Cadwalader - I suppose the chart speaks for itself; unless the Court wants the witness to explain any portion of it.

The Court - Is this evidence objected to?

Mr. Cadwalader - Yes sir. So far as it is oral.

The Court - Well, it is all oral.

Mr. Cadwalader - I suppose they can put in the chart if they want to.

The Court - They have not done that.
Mr. Cadwalader - We object to the oral evidence.

The Court - On what ground?

Mr. Cadwalader - It is immaterial and incompetent.

The Court - And not the best evidence I suppose? I will give you another exception, gentlemen.

Mr. Wilson - Both of these maps have been published, I believe, and will be produced. The one here, and the chart for 1880.

The Court - The maps are not yet offered.

Mr. Wilson - I understand this is the basis of the statement which the witness is giving.

Mr. Hart - We don't object to their putting these official maps in evidence. They speak for themselves.

Mr. Cadwalader - Let that be marked.

The Court - The last number was number seven.

Mr. Wilson - In what year was that made?

A. The hydrography was executed in 1856.

2-- And the topography?

A. I think it states on the map.
 <showing to the Court>

The Court - It was published in 1863?

Mr. Cadwalader - Where is the other one?

The witness: It is ^{not} here. But I will produce that later if you wish. The other one is not here.

Mr. Cadwalader - Is the other map printed?

A. I think the other map is not printed. I don't think the coast survey have ~~and I think~~ had it printed yet. But I have compared this map with a copy of their map of 1880. I have seen an official copy, coming from the engineer's department or the Coast Survey.

Mr. Wilson - Was it lithographed?

A. No sir. It was a tracing. I do not think it has been printed. I can obtain a copy.

The Court - You probably better withdraw this for the purpose

of presenting it with the other one,

Mr. Dibble - On the basis of that map, what is the deepest water known in San Pablo Bay off Point Pinola?

A. The deepest water shown on this chart, off Point Pinola, is six and one half fathoms. With a general depth along the channel of about five fathoms - in the deepest part of the channel. These soundings are based upon the datum-line of mean low tide.

Mr. Hart - Don't the map state that - ?

A. Yes sir.

Mr. Hart - Then why should you prove it by this witness?

Mr. Dibble - State if the depth of the ship canal in San Pablo Bay has been diminished?

A. From my examination of the two charts, I say that it has not, practically. I could illustrate that better, if I had the other chart here.

2 - When did you make the exam-

mation?

A. I have looked at it several times this year. I have compared the two charts together several times, this year. I should say that the channel is narrower some what. But it has not diminished in depth, practically.

Mr Cadwalader - What is the date of the last chart?

A. I am not sure. I think the soundings were made in 1880.

They may have been made however in 1879. I am not absolutely certain.

Mr. Dibble - What proportion of the filling in your judgement has come from the ~~statement~~ sediment brought down by the Sacramento and San Joaquin rivers, and what from other sources?

Mr. Hart - I object. I want the witness to show himself to be competent so that he may not be giving us guesses.

Mr. Dibble - What proportion of the filling in your judgement comes from the sediment brought down by the Sacramento and San Joaquin rivers,

and what from other sources?

Mr Hart - We object until the witness is shown to be competent.

The Court - Have you taken any observations?

A - I have devoted a great deal of thought to it. And I have made a good many soundings to test the material in the bottom of the San Pablo Bay.

Q - And in the river?

A - ~~And in~~ ^{I know} the material that is in the river. I have made tests or had tests made of the material in the river.

The Court - Go on then.

A - In my judgement - my judgement is, as the result of my investigations and studies, that there is more of this material that came from the agricultural counties and the natural wash. I think there is more of this material that came from the agricultural counties and the natural wash.

Mr Hart - That is not answering the question, and I move to strike it out.

Mr. Belchen - That is to say; the proportion is greater from the agricultural than from the mining counties.

Mr. Hart - Let the Reporter read the question.

The Reporter: What proportion of the filling in your judgement comes from the sediment brought down by the Sacramento and San Joaquin rivers, and what from other sources?

Mr. Hart - I understood the question to be in relation to the rivers and other sources?

The witness - I did not understand the question. Excuse me, I should say that those rivers bring down perhaps half the amount of filling which is now being deposited in San Pablo Bay.

Mr. Hart - The Sacramento and San Joaquin rivers?

A - Yes sir. I should say that the other half comes from material brought down by streams, by many small streams that empty into the San Pablo Bay. In support of that statement I have examined the creeks on both sides of the San Pablo Bay.

And it is very easy to ~~say~~ see from ~~character of all~~ the ~~character of~~ the bottom mud in the bottom of San Pablo Bay, that these small streams have contributed ~~from July to this~~ very largely to ~~this~~ filling up.

2- What are those streams?

A Well there is the Petaluma Creek and the Napa Creek and the Sonoma Creek. They are the largest creeks on the north bank or on the north ~~Shore~~ ^{Shore}. There are a large number of small creeks coming in from the south shore.

2- What part of this filling in your judgement comes from mining debris or sediment?

A I should say roughly, that not more than one third in my judgement comes from that source Mr. Cadwalader - From the Rac-
raments!

A From mining debris

2- Into San Pablo Bay?

A- Yes sir. May be there is more from that source; but that would be my estimate.

Mr. Dibble - State what proportion of mining debris and sediment

comes from the San Joaquin?

A- I think but little.

2- It has been stated that the lands on Sherman Island have been injured by the filling up of the Sacramento? Are you familiar with the Tule Islands such as the Randall, and Tule Island and other similar islands?

A- I am familiar with some of those islands. More particularly with the Tutchel ^{Island}. That adjoins Sherman Island. I examined that once carefully in a professional way. I was consulted by the owners in reference to ascertaining whether it was worthwhile to continue their efforts to reclaim it or not. Mr. Hart - I have not heard of that Island before.

A- It is at the junction of the San Joaquin and the Sacramento.

Mr. Dibble - State whether ^{or not} these Tule Islands can be ~~now~~ protected from overflow by embankments built of the ~~very~~ material found on those islands?

A- They can be for a short time. But permanently, they can not. Per-

manantly they can not.

Mr. Hart - Object to that as being irrelevant; whether they can be protected by embankments made of ~~the~~ their own material;

The Court - I think we spent several days over that.

Mr. Hart - No sir. The subject we spent several days over was as to the necessity of embankments with reference to determining the amount or height of high water ^{in the Sacramento now as compared with the high water} formally, before the river had been filled up. That was simply with reference to demonstrating how deep this stuff had filled up the river-beds.

After a discussion the court said:-

The court - It seems to me that this is all one question. I don't see any difference. The question put before was as to the damage done to these lands in consequence of the filling of the river with debris. This is the same question on this side

Mr. Hart - I don't think there is anything in it. However, I will withdraw the objection

The court. I wish you ^{had} thought of that before you were gone into this discussion

A The reason why it is impossible to protect these lands from inundation by levees constructed of material taken from the islands is that this material is nothing but peat or half formed peat and when the levees are freshly made they keep the water out very well but after a year or two the material begins to rot and it is subject to half a dozen different sorts of accidents. It will float — the material composing these levees will float. I have many times for curiosity torn down pieces from these levees and thrown them into the water and have seen them float away. And they will burn, and ~~they~~ also when they get a little old they will crack, form large cracks and from

the peculiar soil on which they are placed. They frequently sink down making breaks and gaps so that with material like that it is perfectly clear to my mind it is impossible to obtain reclamation.

Mr Stuart You say it is impossible? A That is my opinion.

O To reclaim those islands with levees constructed of the material coming from those islands - like Twitchell Island.

Mr Wibble Can those islands be protected by levees made from material brought down the Sacramento River?

A The sandy material brought down the Sacramento River is infinitely better for making levees than the peat, and if they can be reclaimed in my judgment the only way

will be by constructing levees of this sand. Sand if properly treated will make an excellent levee.

Q Suppose that Suisun Bay were filled nearly completely up. Would that filling have any injurious effects upon the Harbor and Bar of San Francisco? A In my judgment it would not. It would not have any perceptible effect. Suisun Bay is at such a distance from the Bar of the Golden Gate that if Suisun Bay were entirely filled it would have a very slight, if indeed any, ill effect on the bar.

Q Will the land now being built up in Suisun Bay ultimately become valuable for agriculture?

Mr. Start I object to the question that it is a mere

speculation into the future
 (<The question is withdrawn>)

Q The River Po has been mentioned in this case. Are you familiar with the general characteristics of the River Po, and if so state them to the Court.

A I am familiar with the Po. I have read a great many works in regard to it. The Po is a river whose general characteristics very much resemble those of the Sacramento River, with this exception: that the Po discharges directly into the sea and the Sacramento River discharges into Suisun Bay. The Po is drained on the North from the Alps and on the South by the Apennines and it resembles the Sacramento which drains on the one side from the Sierra Nevada and on the other from the Coast Range.

Both rivers have a large amount of low land towards their mouths and the resemblance between the two is very great. On the Po the most extensive measures have been taken to reclaim and protect the land on its lower portion and with very considerable success. But in their natural condition the two rivers resemble each other. The Po brings down a much greater amount of sediment though than the Sacramento does.

Q In that connection state what kind of sediment? A The sediment chiefly comes from the alpine Rivers. It has resulted in building ^{out} ~~up~~ the mouth of the river at a very rapid rate — more rapid of late at least than in the earlier

days. In discussing or studying the characteristics and features of the Sacramento River the engineering plans for reclaiming and protecting these low lands on the Po is a very interesting example of what we can do here or can expect to do here. Because the land in the Valley of the Po is very fertile and very densely populated now.

Q It has been stated that the American and Sacramento Rivers sometimes change their courses and wash away land upon their borders?

I have you noticed that?

A I think I have answered that.

Q Did you answer it as to the amount that had been washed away for instance from Sacramento to Folsom? A The American

River has washed away land all along its banks in places and it has built up land in other places. The Sacramento has not changed nearly so much.

Q There has been testimony to the effect that the lands along the Sacramento River have been injured by ripage water. State what the result has been in other rivers where the water is higher in reference to the littoral land that is the case with the Sacramento? A A large part of the lands in Holland.

Mr. Caldwell & Lutz, we have had enough of this statistical testimony and it is hardly necessary for the witness to state what appears in publication on the subject.

Mr. Belcher, I can change the question so as to

inquire his judgment as to whether the higher water which they claim to have had here in Sacramento within these later years is due to seepage from the river or to some other cause

a In Sacramento my opinion is that what they call seepage - what has been termed seepage by several witnesses during this suit is nothing but water which comes from the back or higher lands together with the water which is used in irrigation and which comes from their water works. I have looked into this question of seepage professionally several times before once or twice quite carefully and in every case where I have made a careful examination, I have found

that the water was making always into the river instead of from the river. I ~~note~~ remember on the Ohio River once where I looked into it, as I say quite carefully, people insisted that the low land which had been protected by a levee was being injured by ripage water. I found by comparing the depths of the water in several wells that even with the river at quite a high stage that the water was making its way into the river. That that will be the case it seems to me is very natural. Can I illustrate it?

The Court That is observed drainage and not ripage?

Can I explain why the water would go that way?

Q Yes.

<The Witness here made a diagram> A This represents in a rough way the examination which I once made on the Ohio River. The river was up quite well in its banks at the time. There was a well sunk immediately in the river bank and one dug in the low lands and there were wells on the higher ground, some further back. I found by my surveys that the water in the well next to the river was lower than the water in the next well and that the water was still lower in that well than in the well immediately back and so on going towards the hills, that the general slope of the water as it was making its way by percolation to the river was towards

the river and I think that in the case of Sacramento that would be true also

Mr. Leadwala Q I think you located the bluffs on that diagram?

A There were no bluffs at this particular place. but there was higher ground the cause of that is easily understood; as the water obtained a hydrostatic head from the superior elevation of the hills immediately back and the hydrostatic pressure forced the water into the river

Q Just mark the well on that diagram and state the distance from the river A In this particular place it was about a mile and a half if I remember right. I am not sure about that. There were several

wells more than I have shown on this plan in this particular case.

It seems to me improbable too that even with the raising of the Sacramento River bed that the amount of so called seepage from the river back should increase because I find in my mining experience that muddy water running through loose soil and even through gravel invariably closes it up. That is the universal tendency when you run muddy water through the soil. Water similar to that which runs in the Sacramento River fills the interstices and small openings and the small seams. In our mining ditches we frequently run muddy water in them on purpose. We run water from the mine in them when we

can do so but sometimes
 we do mining on purpose
 to run in muddy water
 to close the ditches.
 And I think the effect
 would be permanent
 from the observation I
 have made that the
 sediment carried in the
 muddy water or the silt
 is carried a long distance
 into the bank. For instance
 when we have had a
 very leaky ditch we
 commenced running muddy
 water through it and the
 water at first would run
 through the soil where
 the ditch was leaking
 perhaps 100 or 150 feet
 and come out muddy
 and by and by the
 leaking water would be-
 come clear until finally
 the leak would stop
 and my idea is and I
 have no doubt upon it
 at all that for this

whole space of 150 feet from the bank all the interspaces were filled more or less with the muddy water

Mr Broadwater That is what you call puddling?

A It is hardly called puddling. It is not properly called puddling, but miners frequently call it puddling a ditch.

Mr Dibble Q If there be any seepage does mining debris cause any of it?

A Well I think I have answered that from what I have said before. Certainly the muddies you make the water in a stream the less seepage there will be.

Q What do engineers now consider the best method of draining cities?

A I think it is the universal opinion among engineers and I have talked with a great

many of them about it
 that the only proper way
 to drain cities is to pump
 the sewage out. I know
 for a long time Paris
 was considered one of the
 best drained cities in
 the world. They had a
 very expensive system
 of sewers which I have
 been through and they
 drained directly into
 the Seine but they found
 that the stench and the
 odors coming from the
 sewers and from the river
 Seine into which they are
 discharged is most ob-
 jectionable and Paris is
 now considered by engin-
 eers as one of the worst
 drained cities. In London
 all the sewage is collected
 in long deep sewers and
 it is carried down far
 below - several miles
 below the City proper
 and is there pumped out

Amsterdam is drained in the same way and Berlin I think is so. I have seen the works at London and as I have said it is the universal opinion among engineers there can be no thorough and proper sewage of the large cities except by pumping.

The Court Does not that depend on the economy of paving the material?

Ans Sir. They attempted in London to pump some of the sewage material but I do not think with any success. I was informed by one of the engineers this year that it had not been successful and nearly all is discharged in the river Thames when the tide is ebbing.

Mr Cobble It has been stated in the testimony on the other side that the pavements and

American rivers were free from sediment or less muddy during the present year than for some years past. Supposing this to be the case, was it due to the stoppage of any hydraulic mines by injunction or otherwise?

A It was not due to the stoppage of hydraulic mines certainly.

Q State why? A On the American River there is one mine stopped by an injunction and that is the Gold Run mine. The injunction was served after the usual supply of water was exhausted. They could have worked no more in any event. There were five mines stopped by injunction in Nevada County, the Excelsior the American Co., the Milton Co., the Bloomfield Co., and the

Blue Tent Co. They were
 stopped in June. I think
 early in June. All these
 mines these fine mines
 in Nevada County were
 working the deep heavy
 blue gravel in which
 the duty of a miner's
 inch varies from $2\frac{1}{2}$ yards
 to 4 yards. After these
 injunctions were served
 the water which would
 have been used in these
 mines and on the deep
 and heavy gravel was sold
 to other Companies who
 used it in washing top,
 or surface gravel so
 that in fact the ultimate
 result of the stoppage of
 these mines by injunction
 was to discharge into the
 rivers surface gravel
 instead of bottom and
 heavy gravel and therefore
 as far as these injunctions
 and suits are concerned
 there was more debris

discharged into the Yuba River. It would otherwise have been the case.

Q Can you give any other explanation why the Sacramento water was clearer in 1881?

A The only possible explanation I can give as far as mining is concerned is that generally through the mining districts they are working more bottom gravel than surface gravel because these fine mines that were stopped represent but a small fraction of the whole number of mines and the general tendency is to work bottom gravel instead of surface gravel.

Q Have you ever lived in Mexico? A I have.

Q Are you familiar with the old Spanish and present Mexican customs and methods in regard to

mining? Ayres I am.

Q If so describe them.

< Objected to, and question withdrawn >

Q You have spoken of large quantities of debris being now in place in the beds of the California rivers. Please give your views as to what the effect of this debris will be supposing all mining to be discontinued from this day?

< Objected to and question withdrawn >

Q Messrs Grunsky and Allardt described their method of computing the amount of material lodged in the bed of the American river. Did you listen to their descriptions of such method? A I did

Q Do you consider their methods as accurate?

A I do not.

Q Why not? A In the first place as I understood

from their statements they simply estimated by passing down the river on horseback its length and its width to obtain the surface area. It should in my judgment have been measured or surveyed. In the next place, as to the depth they assume that they could tell where the original high water mark was. It is my opinion that it is impossible for anyone to determine it in that way. It was simply a guess in which they might be very much out of the way possibly as to the depth at which they fixed it.

Q As an Engineer, how would you make such measurements? A I can best answer that by stating the directions which I gave to Mr Wren. I requested him to make a

Careful survey of the river from where the tailings had accumulated, from Canon Creek down to Rice's bridge so that he could determine with accuracy the present surface area. I directed him to obtain all the information he could from people who had lived for many years along the river banks to determine what the depth of this gravel was. It seems to me that that is the only way in which to obtain a correct idea of the depth. It would be impracticable to sink shafts along the line and it would be necessary to sink a great many in order to arrive at the correct depth.

Several witnesses have testified to water worn marks along the margins of the American river.

Now in your examination of the North fork above Rice's Bridge did you notice such marks and if so to what cause did you attribute them?

A few marks along the American river above Rice's bridge which were water worn more or less and which I believe were caused by the scouring of the light surface gravel, which as I have stated before had a tendency to move down in years past and has caused that scouring action along the sides.

Q Mr Allardt stated that from Rice's bridge up to Canon Creek the difference between the present bed of the river and high water mark was from 20 to 25 feet. Now if you observed in regard to this please state what, in

your judgment this difference was? A I measured it in quite a number of places and where I measured it the general difference was about 12 or 13 feet.

Mr. Cudwala What was that you measured?

A The difference between the present surface of the river and the highest water marks as shown on the banks of the river.

Mr. Noble @ 1 ton in a muddy river with rocky sides can the height of high water mark be determined? A In a muddy river flowing between sides of smooth rock either of slate or granite the extreme limit of high water mark is determined more clearly by the muddy lines — determined as accurately as though a painter had gone along with a brush and painted the marks —

marks which the most careless observer cannot fail to distinguish

Q Messrs Grunsky and Allardt estimated the velocity of the American river at flood by a comparison with the velocity of the stream at extreme low water. Is this method in your opinion a correct one? A It is a very novel one to me certainly but not a correct one

Q State why not and also give what you consider would have been a proper method of determining velocity at high water mark?

A It is incorrect because in a little river as the American river was at the time of their visit the current was very irregular. Little ripples formed all along its course and it was difficult to determine its mean current. This

river has a very irregular
 section, a section entirely
 dissimilar to the section
 which the river would
 present at high water mark.
 The only and proper way
 to determine the velocity at high
 water mark would be to have a
 plan or section of the river showing
 its sectional area at high water,
 to know the grade with which the
 river descends and also to have
 a plan showing the curvatures of
 the river. It would be necessary to
 compute the diminution of the cur-
 rent which would be due to these
 bends which are frequent in the
 mountains. With these data
 which are easily acquired
 an engineer can come pretty
 nearly closely to the amount of the
 flow. But the method which
 they pursued you could not
 tell anything about it in my
 judgment.

2. Mr. Allard estimates the amount of old surface washings in the Gold Run mine at 38,000,000 cubic yards. Was this estimate correct?

A. I have stated before my estimate was 60,000,000 of yards which I believe to be correct.

2. Mr. Allard testified that by filling a bottle with water coming from the lower end of the Gold Run tunnel he found that the water contained 18% in volume of solid material and from this experiment he estimates that each miner cubic of water will transport 14.4 cubic yards of solid material in day and from this data he calculated the amount of material that would be washed into the river in a year. Now please state what value should be attached to such a test as that described?

A. It seems clear to me that no value should be attached to such a test as that.

2 Why not?

A. You might just as well attempt to estimate the amount of gold in dollars on the Gred Run bank 400 feet in height by taking out a handfull of gravel and having that assayed and determining the quantity it would contain per ton or you might make another illustration; you might go into a wheat field ten miles square and take a square inch of the surface and find out how much wheat was in that square inch and calculate the amount of wheat on the whole ten miles square from that data - the data is insufficient

Q What Experience have you had in determining the quantity of material washed in various rivers? A I have had a large amount. I think I am the first Engineer that ever publishes any figures, and perhaps the first who ever estimated the amount of material that a mine's wash would wash

I found that necessary some 10 or 11 years ago, and I made and have made since where I have had an opportunity careful estimates of pits that have been excavated and have determined from the amount of water that had been used in excavating those pits, what the duty of a miner with of water is. That duty varies under different conditions

Q You have already stated the duty? A I think I have not

Q If you have not stated the duty of an inch of water, do so?

A. The duty of an inch of water depends upon the character of the gravel, upon the grade, and somewhat upon the amount of water used. It varies in the observations which I have made from 9 to 10 cubic yards per inch down to 2 yards. In a mine like that at Boes Run I would estimate without knowing what the amount

of duty really was, from $3\frac{1}{2}$ to 4 yards. As a general principle the duty of water increases about as the square of the inclination of the sluice, that is that a sluice with a grade of 6 inches to 12 feet and another sluice with a grade of 12 inches to 12 feet, is twice as much, the sluice of heavier grade will carry 4 times as much material, and also a sluice of 9 inch grade to 12 feet about twice as much as a sluice with a grade of 6 inches; that would not be true with sluices having a grade of only one or two inches to the 12 feet, because there is such slight inclination that very little gravel and no coarse gravel would be carried.

2. State the proper method to be taken by an Engineer in determining the annual amount of material washed from the Palo Verde mine?

A If I were called upon to

determine such a proportion I
 would if possible make a meas-
 urement of the excavation and
 ascertain the amount of water
 which had been used in all
 and then from that determine
 exactly what the duty of the
 miners is worth. If it were
 impossible for me to make
 those measurements and obtain
 the information in regard to
 the amount of water which
 has been used I would go to
 similar mines, and there
 are many of them in the
 State working on about the
 same character ^{of gravel} and then
 shutes of the same grade and
 ascertain what they washed in
 those mines. And there is a large
 amount of information that has
 been published in regard to the
 duty of the miners worth. Mr.
 Hall's report contains a good
 deal of it and I have pub-
 lished a great many reports
 in many of which the duty
 of a miner's worth with

grader of 6 or 6 1/2 inches to the 12 feet has been given and Mr. Bowie has published a great deal of material in regard to the same matter, so that I think an Engineer would have had no difficulty in arriving at a pretty correct result. He certainly would have had no difficulty if he had studied the authorities which are available at present in regard to that matter.

2. Mr. Allard states that only cobbles as large as a child's head were washed through the mining sluices of the hydraulic mines. State what you have observed in that regard. Mr. Cadwalader He did not say that, and that is not a fair question.

The Court. Leave out the allusion to Mr. Allard and ask him if he saw cobbles as large as a child's head.

Mr. Dibble. Did you see cobbles as large as a child's head

washed through the sluice
of the hydraulic mine?

A I have seen cobbles as
large as a child's head washed
through a hydraulic mine. A
cobble of the size of a child's
head comes in about 15 or 16
lb weight.

Q What have you seen in ref-
erence to size?

A I have never been at this
particular Gold Run mine when
the lower mine was at work,
when they were washing through
this deep tunnel, but I have
been in other mines working
upon about the same grade.

Objected to by Plaintiff.

Objection overruled and plain-
tiff excepts.

The witness And in the Bloom-
field Mine I have seen boulders
I think one weighed 2200 lb,
I measured it, I am not
quite sure in regard to that.
I have seen them 1200 or 1500
lb in size, passing into the
sluice and tunnel. Such

(Ex 4)

Boulders, as large as that, comes
work their way very slowly
down through a sluice, but if
we get at the Bloomfield boul-
der weighing 200 or 300 or 400
or 500 lb. they go through with-
out any trouble at all

What effect has a deposit
of large stones in making a
permanent tailing dam across
a river

Objected to as irrelevant,
Objected overruled and Excep-
tion taken by Plaintiff

A. The large stone the better
it is so far as the permanent
lodgment of the material is
concerned

2 Mr. Allard stated that
the miners make the bottom of
their sluices as rough as possible,
is that correct?

Objected to on the ground
that it is assuming that which
has not been proven

The Court. Omit the allusion
to Mr. Allard

Mr. Dibble. Do the miners

make the bottom of their sluices as rough as possible?

A They do not

Q Why not? A The object of the miner is to discharge as much material through his sluice as he possibly can. The whole profit in hydraulic mining consists in getting rid of the greatest amount of material from a mine that you can and therefore they make the bottom of their sluices as smooth as they can, that is consistently with saving the gold

Q What do they generally use at the bottom?

A There are three sorts of panning in use now - really four sorts

The Count. I do not know how this is important in this case. It seems to me that we are spending a good deal of time over trifling matters.

Mr. Dibble State whether the grade of the North Fork of the American river is

Steeper above Rice Bridge than it is above Stevens' Bridge? What is your observation in that respect?

Mr. Cadwalader Subject to that as it has been gone over Mr. Dibble I want to show that the statement of Allardh and Trunsky is incorrect in that particular.

The Court, Proceed.

Mr. Dibble. State whether the grade of the North Fork of the American River is steeper above Rice's bridge than it is above Stevens' bridge and what is your observation in that respect? A I think the grade is less above Rice's bridge than it is higher up the river.

Q Is the transporting power of water increased as the sixth power of its velocity?

A It is not. The transporting power of water depends, on the work which it will do is in the ratio of the square of the velocity. The amount of

Material, the size of the material which water will move, supposing there will be no friction whatever is theoretically in the ratio of the 5th power of the velocity. The work which moving water will do or any moving liquid will do or any moving body is as the square of its velocity.

Q. If the velocity of the water in the American river were the same as it is in a mining flume, would the river move as large stones as the flume? A. Certainly not.

Q. Why not? A. In the flume the gravel and stones which are being moved down, act as dams so to speak for the water, they fill up the larger part of the space in the flume and therefore the water pushes them right along; if the same material is placed in the bed of the river, the bed of the river is wide and allows the water to spread around

And the grade of the Sluices are very steep being usually 200 or 300 feet per mile, while the grade in the American River is light, only from 25 to 45 feet to the mile. The best evidence of the correctness of my statement is, the fact that the material does lodge in the American River, material which has been unquestionably washed from the mine, and washed out at a very rapid rate. I have found in Experimenting in our Mining Sluices —

Mr. Cadwalader You have not been called upon for a discourse
A Shall I finish

The Court. Is this an Explanation of your answer?

A Yes Sir

Q So on. A I have found by Experimenting in our Mining Sluices that boulders weighing as much as 200 or 300 lbs. will travel at about $\frac{2}{3}$ the rate of speed that the water does in those Sluices

Q. How is the transporting power of water affected by the character of the surface on which the material transported moves, that is to say, would it make any difference whether the surface of the bottom was of glass, sand - paper, wood or iron? A It would make a great deal of difference, depending on the character of the surface. If the surface of the bottom be smooth there is very much less friction, which is an important element, the most important element in determining the size and amount of material which water will move.

Q Are you familiar with Chevalier Du Buat's tables quoted by Mr. Allardt and if you know state what value is attached to them by your profession? A I am familiar with the tables which I have heard quoted. Very little importance is attached to them

by my profession because the conditions varies so greatly in such matters. The experiment to which you refer was made by him in a wooden trough and under conditions which can never be obtained, so so far as determining the velocity which will move material of a certain size in rivers they have no earthly value and Engineers attach no importance to them, that is all the Engineers to whom I have talked in regard to the matter, and that is a good many.

2 Can the velocity of a rivulet and a large stream be determined by the formula that the velocity equals the square root of the product of the hydraulic mean depth by the fall in feet per mile, multiplied by a variable coefficient ranging between 1.16 and 1.31.

A It can not with even any approach to approximation

2 Why not?

A. As determined by Experiments made. I have made a great many in that direction and also experiments made by the standard authorities — it is shown that the range in a formula of that sort — that the range of that Coefficient is as 50 to 1. The range of that variable coefficient as you have given it is between 1.16 and 1.31; that is a variation of only about 12%. Instead of that, that Coefficient has been found to vary 50 times. I have found in my own Experiments upon pipes which are very smooth compared with mouths of ^{great} rivers that that Coefficient varies nearly 7 for 1 even in pipes.

Mr. Belcher State the minimum and the maximum there of the variable coefficient.

A. With that same formula?

2. Yes sir, the same formula and then state a proper formula

Mr. Cadwalader You say that
the range of the Coefficient
is 2.5 to 1? A 50 to 1.
The formula is in a shape
which is very little used.
In certain Extreme cases, the
Coefficient will vary from
.07 to 3.4, and as I say in
my own experience in pipes
I have seen that coefficient
vary from very nearly 3 up
to 2.

Q Have you stated the formula
adopted generally?

A I have not

Q State it? A The formula
generally used in determining the
velocity is $v = m \sqrt{r s}$ - v
being the velocity. m the
variable coefficient, r being
the hydraulic mean radius
and s the sine of the incli-
nation. The coefficient m .
which is variable is deter-
mined by the particular cir-
cumstances of the case. Various
authors give various ways of
determining that.

Mr. Cadwalader Let me ask you this, the way you state it and the way Mr. Allard states it, the difference consists in the coefficient?

A No sir, not at all, the Equation which I give is the same which Mr. Allard uses, except transposed, but in a different shape. It is the same with the exception that you use a coefficient of greater variability. It is exactly the same because as I understood him, his coefficient was variable also.

2 But a smaller range?

A Yes sir. There are many other formulae some of them very complicated indeed which are used and it would take me a long time to describe them.

Mr. Drabble Have you examined the sand in the Gold Run mines? A I have

2 And also in the American river above River bridge?

A I have.

2 Have you examined the sands in the American River opposite Sacramento and thence running up the river to Folsom?

A I have, also

2. State how the sands which were found in the American river, in the mine, and above Rees bridge, compares with the sands found in the American River opposite Sacramento and from there to Folsom?

A The noticeable difference is the amount of mica which is contained in the sand between Sacramento and Folsom and which seems to be almost entirely lacking, or much of that same character seems to be entirely lacking from Rees Bridge to the mine at Gold Run. That is very noticeable indeed Mr Cadwalader. That is you compare a section of the American river between here and Folsom, with a section of the American river below

Rees Bridge? A Yes sir

2 The general appearance is the same? A Yes sir

Mr. Debble Is the Aneroid barometer and equally exact instrument for the measurements of heights with a mercurial barometer?

A It is not by any means. The mercurial barometer when properly used, is quite an accurate instrument for measuring differences in elevation, and an aneroid is not at all

2 What are the most approved authorities on hydraulics?

A The latest authorities as a general thing are what are considered the best, except in discussing the Elementary branches of the science. I suppose by hydraulics you mean the laws governing the motion of water or fluids. The American authorities are Herphreys and Abbott, and Fanning. The latest Eu-

lish authority is Jackson. The latest French authorities with which I am familiar and which I can now name are, D'Arcy and Bazin and the Swiss authorities are Kutter and Gangollet, and in Germany Dr. Hagen.

Mr Belcher and what authorities upon the Sedimentary Character of rivers and the Amount of Sediment carried by them?

A. Oh a great number of authorities see, Engineering works

Q In the works which you have named?

A I do not think that any of them contain information of the sort that you ask.

Q Will you name then some of the works which contain that class of information?

A Humphreys and Abbott, Report, Beardmore, Lombardini, that is an

Italian work and quite a number of French works, Baumgarten, for one, and a great many others that I cannot give to you just now.

2 As to Lyell?

A Lyell gives some information in regard to it; Jackson gives some information in English in regard to it and Jones gives some information as regards to it.

2. All I want to know is the character and position which these books hold among scientific men?

A. All the works which I have mentioned are considered as good authority by scientific men.

}

Crop - Examination of Oramelton Smith

Mr. Cadwalader You have been the head of the Hydraulic Miners' Association how long?

A I think I have been President for $3\frac{1}{2}$ to 4 years perhaps, I am not sure how long, ever since the organization was formed.

Q You have taken charge of all the suits brought against the hydraulic miners?

A No sir, not of all

Q You have taken charge of the defense of this suit, have you not? A There is a very considerable degree

Q You have taken charge of the suit brought by the City of Marysville?

A No, that suit was brought when I was away and I have had very little to do with that.

Q You have taken charge of the suit brought by the People

of the State against the Mi-
cene Company. Or I have
had some little to do with
that not a great deal, very
little.

I think is an association I
believe of hy draulic mines
is it not? Or An associa-
tion of mines generally, chiefly
composed of hy draulic mines.

I Upon what basis are you
associated together so far as
value are concerned

Mr Belcher I object to that
as immaterial how that
may be. I make the objection
first that it is not cross-
examination and immaterial
Mr Cadwalader I want to
know what values the owner
of these different mines of
which he has spoken have
placed upon them - rather
than be interrupted just at
this point I will go to
something else; and I will
return to the matter after
a while. What year

Did you arrive in California?
 A 1869

Q What was your age at
 that time? A I was 29
 years old at that time

Q When did you first become
 associated with the North
 Bloomfield Mining Co.?

A My first association was
 in the year 1869

Q What place did you hold
 in that company?

A At that time I was then
 Engineer.

Q You were then Engineer. Who
 was the President of that
 Company?

Mr Deleker. I object to that
 as not Cross-Examination
 and immaterial

The Court. Is it material
Mr. Cuddevalader Yes so it is
 material in several respects.
 We want to show among
 other things that this Corpor-
 ration to which he says there
 is so much value attached
 and which he used as so

an important an integer in the Estimate of values, has no President, has no secretary, and has no Directors and that it is an abandoned Concern I want to show that these Corporations are disbanded and that they are under an injunction

The Court. If it is for the purpose of showing an abandonment of the mine you can do so

Mr. Cadwalader I will proceed to something else. Mr.

Smith you spoke of there being a connection between the Good Run mine and the Iowa Hill Mine. I will ask you whether it is not true that you can not get into either of that class of mines unless you tunnel through what is called the run rock that holds the blue gravel?

A I do not think I saw anything about the Iowa Hill Mines.

Q If you did you now desire to retract it?

A I do not. If you wish to know the gravel deposit in my judgment, that Lower Hill belongs to the same system as that at Gold Run.

Q That is not what I asked you. A Now I can answer your question.

Q Could there have been any escape of the blue gravel out of its channel in the direction of Iowa Hill without its first going through that main rock?

A Of course, there could be. The channel escapes at Gold Run right at the lower end of Indiana Hill. There ^{it} appears it was washed away by the North Fork of the American River. What extended over to Iowa Hill, has all been washed out by the American River.

Q Do you want to say that there is any deposit

Below the run rock?

A Of course there is.

2 On Indiana Hill?

A The bottom of the channel is below the run rock always

I That is not what I asked you? A The channel is in the bottom of the channel and therefore below the run rock

2 Well, of course it could not escape in the direction of Iowa Hill, without going through that stone wall and it?

A Of course it does - the gravel channel escapes as I told you before at Indiana Hill, at the lower end of Indiana Hill. There it disappears because it has been washed away by the American River.

I Well, I will put the question this way: Is there any run rock? A There is

a run rock of course

2 Is there any gravel in

The Gold Run Channel below
that run rock.

A There is gravel in the bottom
of the channel. I do not
think with due deference that
you ~~ex~~actly understand what
you are asking.

I Below the run rock —
Explain it by a diagram please
Take down those maps and
set down to Whitney's map
A (Referring to Whitney map)
The yellow is gravel and the
red is the overflow of lava

I Put out if you please
with your pencil the course
of that river channel, com-
mencing say at the Middle
Fork and running in the
direction of Gold Run.

A There is only a small por-
tion of the Middle Fork shown on
this plat, only the outcrop-
pings of the gravel.

I Let me ask you this: Is
this what you call the Old
River Channel on the Lower
Hill divide, marked yellow

and looking like a letter P.

A. You are pointing to Dutch Flat there. This is Iowa Hill (referring)

I Well looking like an egg.

A I have never been at Iowa Hill, but I believe it forms a part of the same system of channels as the Goose Run.

Q. This is the question I want to ask you: Does not that deposit lie within the run rock - Is not there run rock on all sides of it?

A I have never been at Iowa Hill but I do not think it does. I have never seen a gravel deposit that way surrounded with a run all the way around. I have never seen it at Iowa Hill and I am not certain in regard to it.

Q What is the dimension of that deposit? A As shown by the plan.

Q. Yes. Of the Iowa Hill deposit. A It is about, a little over a mile long

as shown on this map

Q. You say that is how deep?

A. I have not testified anything in regard to it. I have never been there at Iowa Hill.

Q. Well, I thought you seemed to know all about it. What is the depth of that?

A. I can not tell you I have never been there.

Q. Suppose you would take a cross-section of that comes it be something like the Men cross-section — Suppose you take a cross-section of the Iowa Hill pit comes it substantially corresponds, that is in form with the Men cross-section of the Gold Run?

A. I can not tell you. I have never been there, it might very likely it comes, I do not know though.

Q. You would find the same material in it would you not?

A. Probably, you would, the same general character of material. I have no doubt

but what you would

I think would be very much like the hole in the side of a hill would it not when that core is taken out, it would be like a cradle after the baby is taken out of it? a No sir, I think not, no, I know not

I Well, it would be isolated would it not, it would have no connection, no apparent connection with anything outside of its run after the same character? a It might be by itself

I It might be by itself, well now put your hand on the Golden Deposit?

a The witness does so

I What direction does that run? a Nearly North and South

I What is the nearest bed of gravel lying to it?

a Well, it is identical no doubt or connects with the gravel at Dutch Flat

I Well, what separates the two bodies of gravel?

A I think gravel.

I Is it blue gravel?

A I have no doubt of it, blue gravel between. Blue gravel extends all the way between Gold Run and Dutch Flat.

I Did not go yesterday state this. That you ended the Dutch Flat pit at the Railroad?

A I said I ended my estimate of the amount of material that would be washed from the Gold Run mine by the Central Pacific Railroad.

I Now supposing your testimony yesterday was correct where would you have to go through the country rock before you struck the newest blue gravel deposit at Dutch Flat?

A Please repeat that ~

{

Q Suppose you said yesterday that the blue gravel deposit ended at the Rail Road?

A Excuse me I said nothing of that kind whatever.

Q Well never mind that I understood the witness - says he did say it, that all his estimates of this River Channel stopped at the Rail Road.

The Court But he did not say that the blue gravel ended there

Mr Codwallader he must necessarily have done it The Court Don't argue with he says he did not say it Mr Codwallader Have you traced any connection between the blue gravel deposit at Dutch flat and that at Gold Run?

A I have

Q When and where?

A A great many times

Q How many times?
 A I have been over the ground a dozen of times I suppose, perhaps more.
 Q When?

A This year.

Q Well when this year?

A A month ago perhaps or two months ago.

Q Well just mention the time if you please?

A If it is important I think I can identify the time that I was there this year — I can give you the time exactly (Referring) I was there November 10 & 11th 1881

Q Were you there at any other time this year?

A No I think not.

Q Were you there at any time during the year 1880 if so what times?

A I do not remember of being there in 1880.

Q Have you been there since you made your

Excursion during the Keyes trial in 1878?

A I think that I have been there once that is my impression. I have been there twice I think.

Q How long did you remain each time?

A The last visit I was there two days and at other times I think I have remained there a day generally.

Q Well at what times since 1878?

A. I know I was there in 1878 and I think I was there in 1879 and I know I was there in 1881.

Q Well you said that you were there in 1881, but really have you been there since 1878?

A I have been there once I think I am not certain

Q Before 1878 how many times have you been there?

A I am not certain now I
 Could not tell you.

Q Had you ever been there?
 A I had.

Q Did you ever have any
 business there?

A. I had business there
 Certainly.

Q What is the nearest blue
 gravel deposits at Dutch flat
 to the Gold Run deposit?

A The Dutch flat deposit is
 I suppose.

Q Well I mean what mine?

A. There is quite a number
 of mines I could not give
 you these names there now
 they may be on the map

Q You really do not know
 do you?

A I have heard them
 several times but I have
 forgot now there are so
 many of them.

Q Now what is the form
 of the deposit at Dutch
 flat?

A The lower gravel as a

general thing it seemed to me to contain more boulders and larger boulders than the deposit at Gold Run does
 Q What is the length of the Channel at Dutch flat?
 A At what point.

Q Well I mean at Dutch flat the exposed Channel at Dutch Flat?

A That is a very indefinite question

Q Of course it is
 A The map indicates it better than I could describe it to you.

Q You don't know much about it do you?

A I think I know a great deal about it

Q That runs you say nearly north and south as you recollect it

A. It runs at Gold Run nearly north and south not quite.

Q Where does it end in the north?

A Which the Gold Run Channel
 Q No the Dutch flat Channel
 A Its Course at Dutch Flat
 is more east and west or
 rather it is north east and
 southwest

Q Well what direction was it
 running at Iowa Hill?

A. I do not know I have
 never been at Iowa Hill.
 It is indicated on the map
 here as running north
 east and southwest

Q What is the form of it—
 that is the form of the
 Gold Run and Dutch Flat
 Channels?

A It is shown at Gold
 Run by that section of
 Ureno.

Q What is the form of it
 is it not like a letter T?

A Where the Channels Come
 together probably it is

Q It is about the shape
 of the letter T?

A Somewhat resembling
 that

Q One arm is as long as the other is it not?

A The extent of gravel —

Q (Interrupting) Answer that that question.

A I cannot answer that.

Q Well on that map

A On that map the south western end is shown as being longer than the north eastern whether it may be so in fact I do not know

Q Has there been any gravel taken out of this Channel or Dutch Flat except through the rim rock — I mean on the north?

A There has been.

Q Is there any gravel in that Dutch Flat deposit lying below the rim rock on the north?

A The gravel in the Channel, in the part of the Channel it is necessarily below the

Rim rock.

Q The rim rock is on the North?

A There is rim rock on the south too, there are necessarily two sides to the Valley.

Q Do not get so fast now your theory is that that river extends north?

A My theory is that the River extended in all sorts of directions, as I stated in my direct testimony it is as Crooked as the present River nearly, not quite as Crooked because those Streams Carried more water than the present ones do.

Q Now your Idea is that it goes north?

A. It is not. That is not my Idea

Q Well what is the shape then of the deposit at Dutch Flat and Gold Run at the mine, just take and draw it on a piece of paper will you? With relation to

to Bear River?

A I had better copy it from the map if you want it in that shape?

Q Well just give us the shape of the deposit?

A (The witness draws) That is something like it. the deposit as far as it has been exposed or known to exist.

Q Put the points of the Compass there if you please?

A The witness does so.

Q Now your deposit at Iowa Hill is represented approximately by the letter O and by that at Dutch Flax and Gold Run combined is represented by the letter T that is so is it not?

A I think the diagram that I have shown is correct, in the form of a letter T, for that at Iowa Hill I can only give from the map.

Q How approximately ?

A. The map represents the gravel in rather an oval shape.

Q Where would be the lowest parts of the blue gravel deposit in that T shaped.

A Right along in the Centre of it, the Centre of the arm and the Centre of the cross bar, not always in the Centre though.

Q That deposit you find at what level above the sea ?

A I would have to look that up

Q Well about ?

A I think it about 23 or 2400 feet there I am not sure though.

Q You do not know of your own knowledge or from any actual observation made by you that the Gold Run deposit continues to Dutch Flat ?

A No man would ever be able to answer that question until it was washed out but I know that it extends across there.

Q Then why didn't you yesterday in the quantity of blue gravel which was to be washed in the future as you said into the American River, take that deposit into consideration? A Which deposit into consideration.

Q The deposit between Gold Run and Dutch flat? A I did take it.

Q You did?

A Yes sir I took it to the Rail Road line which is about the boundary between the two claims.

Q Why didn't you extend it to Dutch Flat?

A. Because if that gravel is washed there it must be washed from a tunnel running to Bear River

Q Why?

A Because the tunnel of the Gold Run will be about on the grade when it gets up to the Rail Road.

Q Is not there a great deal more grade on the American River side than there is on the Bear River side?

A It would necessitate to get that grade a tunnel of great length.

Q Well is not there a great deal more grade on the American side than there is on the other?

A You could by running a tunnel low enough.

Q Is not the difference of grade a very large figure?

A Yes sir the American River is much lower than Bear River, the bed of it.

Q That deposit then, it is a mile then from Gold Run to Dutch Flat?

A. I think it is about three miles. It depends.

On what point you take
in Gale Run. It is about
three miles you might say.
O Then there would be three
miles more of this stuff
that could by tunnels be
put into the American
River than you estimated
(Yesterday)?

A No Sir there could not
be.

O You say it could not
be worked by tunnels into
the American River?

A You could work all of
the Dutch Flat deposit I
suppose.

O Well could not you to
the very best advantage?

A I think not.

O Are you sure of that?

A That is my opinion.
Yes Sir.

O How much deeper is
the bed of the American
River than the bed of Bear
River?

A Roughly I think about

a thousand or eleven hundred feet, I am not sure as to that, a thousand feet probably.

Q Bear River is much more filled up opposite Dutch Flat than the American River is opposite Dutch Flat is it not?

A It is.

Q They have great trouble at Dutch Flat now for want of what they call dump?

A In Dutch Flat proper no, I think they have got a very good dump at Dutch Flat.

Q Would not that deposit naturally be worked if it exist from the American River?

A It would require a tunnel of such enormous length.

Q Well would not it be a great advantage.

A. It would be a very great disadvantage, the cost would

be excessive.

Q Do not the Gold Run Mine suffer because its tunnel is not long enough?

A I do not know as to that.

Q Well you say you know all about those things?

A I do.

Q Don't they ^{lose} use a great deal of gold because their tunnel is not long enough?

A. I suppose if the tunnel were longer -

Q They would do better?

A I do not know that that would follow.

Q Now when you cross Bear River where do you next strike the blue gravel on the North Shore of Bear River?

A You find blue gravel at Little York.

Q Put your pencil on it?

A The witness does so.

Q State whether or not there is gravel in the little York deposit below.

the South rim rock - this
blue gravel?

A Below the south?

Q Yes below the top of the
South rim rock; My question is
specific whether there is
not blue gravel in the
mine or Little York below
the south rim rock below
the plane of the top of the
South rim rock?

A In the level do you mean?

O yes sir?

A Yes sir I suppose there
is - will you allow me
to ask you a question -
I think we might shorten
this inquiry.

O I don't know whether
you could or not - now
put your pencil on the
next blue gravel deposit
going north?

A. There is the Guadalupe
and Birds eye Creek.

O They are all on the
same Channel are they
not?

A I think they are

Q Just make a sketch of that deposit?

A I will have to take that from the map [the witness draws] that shows very roughly the Channel between Gold Run and down to Red Dog.

Q What would you liken the shape of that Channel to?

A Something very crooked.

Q Could you tell which way it ran?

A It might be pretty hard to tell the direction - you mean the direction in which the original Channel ran?

A Yes sir?

A. Yes sir It is pretty difficult.

Q Then that Channel would look something like a spider wouldn't it?

A It is very crooked as I told you.

Q Will it look just like a spider or a crab?

A No sir I think nor.

Q Tell something like that?

A No I hardly think it would look like that.

Q Now where is the North Bloomfield?

A Where is the mine of the North Bloomfield? in Nevada County ^{near} on the ridge between the Middle and South Yuba Rivers.

Q What is the nearest mine to it or blue gravel deposit on the south?

A There are the Claims owned by the Eureka Lake Company.

Q How far are they apart?

A No distance apart they touch each other! The Channel runs from the Bloomfield Claim into the Eureka Lake Claim.

Q The Eureka Lake Claim is south of the North Bloomfield?

A South or South west.
Q What is the next blue gravel deposit south of the Eureka Lake

A Owned by a number of people I think they call it the Lake City Company I am not sure what the name is.

Q Is that deposit marked on the map?

A It is indicated here I think sir. There is Lake City (Referring), the Lake City Claim I believe is adjoining the town of Lake City

Q I mean the deposit on which the North Bloomfield works?

A The boundaries are not shown but the gravel Channel extending out of the Bloomfield mine is shown.

Q The course of the Channel is shown - what is this deposit (Referring)?

A Thor is the gravel extending from Badger Hill to Columbia Hill.

Q What figure does that represent?

A A Crooked figure.

Q Suppose you would put four legs to it it would represent an animal would it not?

A I do not know.

Q I am asking your attention to it?

A I suppose that a draftsman by a little ingenuity could make it look like anything almost.

Q Extending your pair of legs here, and here are your hind legs and there is your tail and there to your head - would it not be in the form of an animal?

A It might possibly be in the form of a quadruped if you put four legs to it.

Q Could you tell in which direction that was running?
 A I think I know in which direction that runs.

Q Which way was it running?
 A It ran in a general westerly course.

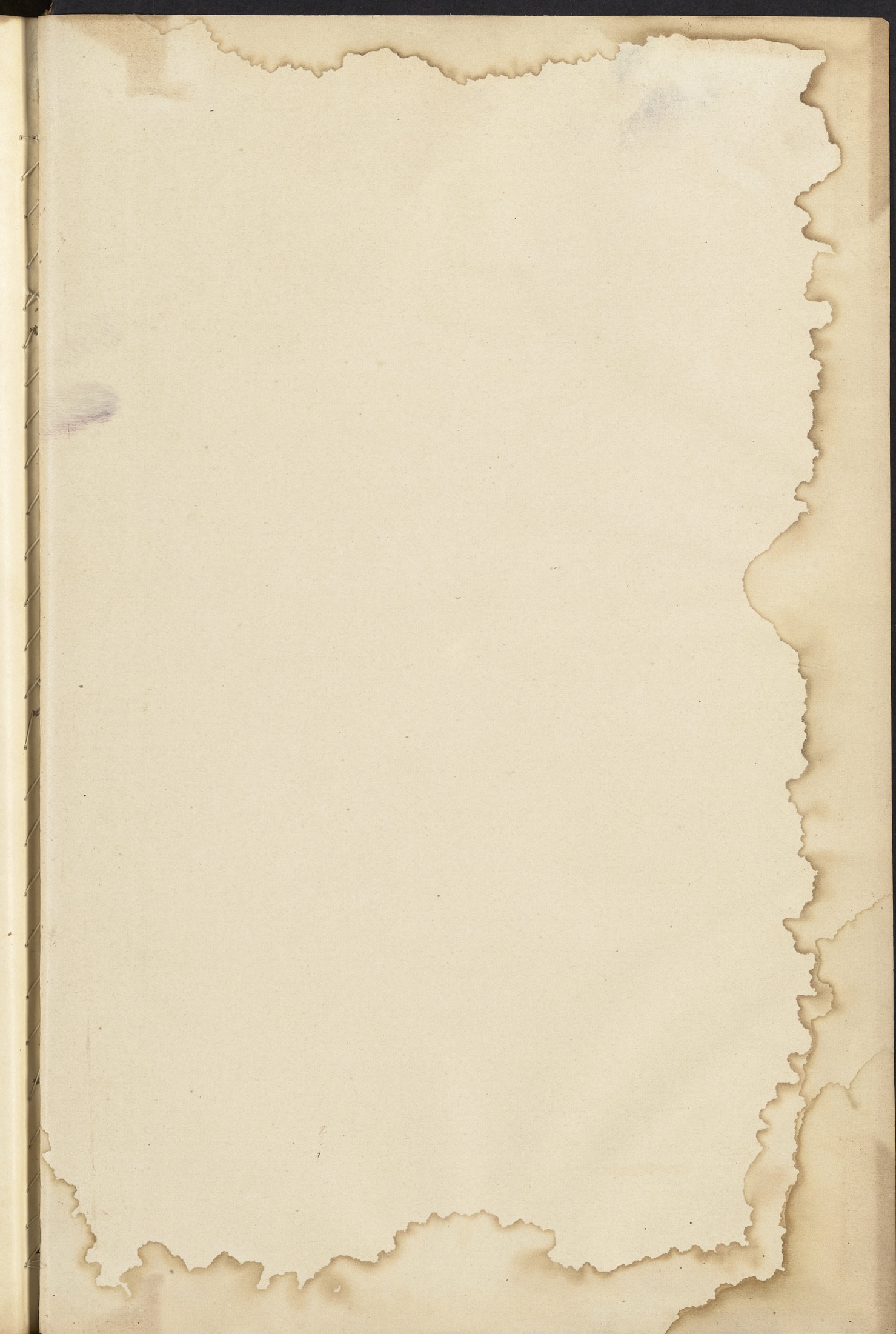
Q In a general westerly course?
 A Yes Sir.

Q The Gold Run deposit runs you say north?
 A Immediately at Gold Run it does, at Dutch Flat its course was north east and south west.

Q Well the deposit is a very irregular one is it not?
 A It is irregular in some respects and regular in others. Very regular in some respects and very irregular in others.

Q When you cleaned the Channel out it is very irregular indeed is it not?
 A It is very regular as a general thing in some respects -

Recess Until
 Thursday Dec 10th 9.30. Am





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